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GLORY

OR

GRAVITY,

THE

MECHANICAL or Second
PART.

Taken from the MSS. of the late *John Hutchinſon*, Eſq; moſtly from looſe PAPERS.

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GLORY OF GRAVITY.

The Second or

Mechanical Part, &c.

AS the Body of Man was made to be a Partner to the Soul, and put it in a State of Probation to qualify it for a good or bad State hereafter; and the only End of creating all the Matter of this Syſtem, and of forming all the Powers in it, particularly in the Light, is for the Production and Support of the Bodies of Men while they are to ſubſiſt, and no longer: I ſay only, becauſe no Mortal has yet ſhew'd either from Revelation or Reaſoning, that God has any other Uſe for Matter, or the Motions or Powers in it. Indeed ſecondarily, as Man in a State of Qualification could pervert the Deſign, it may be ſaid that all the Powers in it were to try the Soul of each Man, whether it would regard God as the Creator of the Matter, and the Former of thoſe Powers and Motions, or give up itſelf to Imagination, to the Senſes of the Body, and view them as original Powers. At the Time of Writing the Scriptures, Jew and Gentle, both Sides knew that the Light, the material Glory, did almoſt every Thing in common Courſe; not only the great Operations, but from the greateſt to the ſmalleſt; and as the Gentiles, the greateſt Part of Mankind, had gone wrong, Part of the Scriptures were writ to ſet Men right in that Point. For Man was not only to aſcribe Glory to the Original, the ſecond Perſon, for his ſpiritual Rule, Redemption, *&c.* but alſo for what he performs by his Emblem: And as Glory is the Name of him who rules in the ſpiritual Senſe, ſo Glory or the Gravitor, for there is no Action without an Agent, is the philoſophical or phyſical Name of that Agent which rules in chief in inanimate Matter, in material animated Bodies, *&c.* And as thoſe who pretend by their own Righteouſneſs, or any other Way to ſave themſelves, do what they can to diſpoſſeſs Chriſt of his Glory, ſo thoſe who ſet up any other Agents to perform the Operations of Light, or allow its Operations, but make it independent, do what they can to deprive us of the Idea of him, and to diſpoſſeſs him of the Glory of creating and forming, and of the Operations of Light.

I have ranſacked Antiquity to find the Truth in theſe Matters. I have not only ſhewed the Opinions of the antient Heathens and Philoſophers in theſe Points, but ſhewed that they were all conteſted between them and the inſpired Writers ſome thouſand of Years ago; that there never was any Diſpute antiently which were the Agents which performed the Work, but whether they were independent, or had other Powers in them which were incommunicable.

As many ſeem not willing to be determined by the Authority of the Scriptures in Points of Philoſophy, but have framed Schemes out of their own Heads, or taken them from Moderns thoſe who framed them; ſo contrary to Revelation, and without Pretence to Senſation or Perception, againſt which more than is neceſſary has been ſaid: And as others pretend to depend upon their Senſes, before I begin with them, we muſt examine how that Matter ſtands

As to what comes in by Senſation, that we may not be impoſed upon by truſting to our Senſes, we ought firſt to examine their Abilities and Uſes, know in what they act fairly and impartially, in what they act otherwiſe, and why they do ſo; ſo what Things and Actions they forcibly impreſs Ideas of, and of what they leave faint Ideas, which ſerve only to be ready at call for forming Deductions. I think I may affirm in general, that our Senſes were appointed Centinels to perceive and convey Ideas readily to us of ſuch Parts, and ſo much of Matter, ſuch Motions, ſuch Actions and ſuch Accidents, as are immediately neceſſary, beneficial, uſeful or convenient for us to perceive ſtrongly, thoſe for more diſtant Ends faintly, and ſtronglier or weaklier, as they are more or leſs ſo.

Firſt, that any viſible Part of Matter reſiſts any other viſible Part from entering the Space it occupies; that comparatively the conſtituent Parts of ſome Maſſes adhere ſtrongly, ſome weakly, and ſome continue looſe or unfixed: That by the Force of that fluid and generally inviſible Agent we are tracing, the Atoms of any Part are liable to be divided, and many Sorts of them to be re-united, and each

Part, ſmall or large, is liable to be forced relatively to carry its Space along with it, change Place with others, and each take new Neighbours. But whether all Matter is the ſame, what Sizes or Figures the Corpuſcles of each different Sort of Bodies and Fluids have, what is between thoſe Corpuſcles, what makes ſome liable to adhere and ſome to remain looſe, what that Agent is, which makes them adhere, and how it impels one Part of Matter to divide thoſe of another, or to diſplace and ſeize the Place of another, and ſo proceed, they have very feint or no Powers to ſhew.

Next, as to what concerns the Matter of and natural Motions or Accidents in our Bodies: 'Tis revealed, that the firſt of thoſe Microcoſms, as well as the inanimate Parts of this Syſtem was formed out of the looſe Atoms of Matter at firſt created; and the Workmanſhip or Mechaniſm in the Diſpoſition of the ſolid, fibrous, tubous, porous, and fluid Parts, and the Agents, are ſo contrived, that the known Preſſure without, and a much greater unknown, are not at all perceived, ſo do not hurt the moſt ſlender Tube: And the Laws by which the fluid and ſolid Parts move, will, I hope e're long, appear even more wonderful than in thoſe of the Parts of the great Machine I am now treating of: But at preſent, if any of them be out of Order, we are very ſtrongly affected; but if they be all in Order, and no Superfluity nor Defect, all goes on ſmoothly, and no Ideas, or very feint ones, are repreſented of them by our Senſes; becauſe it concerns us only immediately to know when there is any Superfluity, in order to remove it, or when there is any Defect, to ſupply it; and what we know of them farther muſt be moſtly by Deduction. As to Things which act without our Bodies, we ſee the Motions and Actions of other Animals, but have feint or no Ideas of what moves them; we ſee the Bodies of Animals produced from Eggs, the ſeveral Parts of the ſeveral Sorts of Plants produced from ſmall Seeds, in Succeſſion of Time, varied in Shape, and by Addition of inſenſibly ſmall Parts, increaſed in Dimenſion, *&c.* but cannot ſee how, or by what Means.

Where Matter acts upon Matter, I think I may ſay, there is a Neceſſity, and the Wiſdom of the Creator and Modeller thereby appears; that the Agent, which ſhews us every thing 'tis intended we ſhould ſee, and at the Time 'tis intended we ſhould ſee them, ſhould be every where, and act in every Place between us and the Things 'tis intended we ſhould ſee, where its Motion is not interrupted or diverted by Solidity; and that that which re-acts from each, that interrupts that Motion to our Eyes, ſhould be inviſible itſelf, or elſe we ſhould ſee nothing but that Agent; and as 'tis of Uſe to us to ſee the Things, and not that which ſhews them, ſo we have ſtrong Ideas of the Body at reſt or moved which interrupts the Light, and but feint or no Ideas of the Light, or how it moves; and it is alſo neceſſary, that the Agent which makes us hear every Thing we ſhould hear, ſhould be preſent where any Thing is to be heard, and between that and us, and that it ſhould be inviſible; otherwiſe we could not ſee for it; and generally make no Noiſe, otherwiſe we ſhould hear nothing for it; ſo for that which makes us ſmell, *&c.* And 'tis alſo neceſſary that the Agent which ſupports and moves every thing ſhould be preſent in every Place where there is any thing to be ſupported or moved: And 'tis neceſſary that that Agent ſhould be of ſuch a Conſtitution, and its Force and Directions ſo contrived and apply'd, that it ſhould not only in general, but in particular, ſerve for ſupporting every Thing, or Part, at the Time it is to be ſupported; and for moving every Thing at the Time, in the Directions, and in the Manner it is to be moved, the Parts of itſelf, of all other inanimate Matter, Vegetables and Animals, becauſe two or more material Agents cannot act at once in the ſame Place; and becauſe if there were ſeveral ſuch Agents, each to act upon different Sorts of Matter, or Things, ſo near in Place and Time as there is a Neceſſity of Sorts, or Things, being acted upon, thoſe Agents and their Motions would continually interfere with one another: And 'tis neceſſary that this Agent ſhould, in its ordinary Courſe of acting, not only be inviſible to the Eye, but imperceptible to our other Senſes; otherwiſe we ſhould ſee, feel, or, *&c.* only the Supporter or Mover, and not the Things ſupported or moved. And if the Actions of that Agent were perceptible by any of our Senſes, the Ideas of thoſe Actions would be continually preſſing in upon us, and diſturb thoſe Ideas which are of more Uſe, or more immediately neceſſary to us, as Thunder, Storms of Wind, *&c.* do.

So we have diſtinct, commenſurate Ideas impell'd upon us of our Motion from one Part of this Globe and thoſe Things which immediately concern us, and of the Motion of thoſe Bodies or Maſſes of Matter which we have Uſe for, or are benefited by; but we have no diſtinct Ideas of the Motion of this Globe, or of any Compreſſure of, or of any Reſiſtance in this Fluid, except our Bodies be moved with great Velocity; or of the Motions, or Diviſions, or Adheſions of the Parts of the Firmament, in which We, thoſe Things, and this Globe, are ſupported, and by which we and they move. We ſee that the Atoms of other Bodies and of our own adhere, ſome ſtrongly, and we find, that each weighs ſome leſs, ſome more. As that which makes us ſee Objects does not itſelf appear, ſo that which makes the Atoms of Things adhere, or weigh, does not make us ſenſible that it compreſſes and keep the Atoms together, or that itſelf preſſes, or weighs; becauſe any ſuch Perception would continually diſturb us, and becauſe it does not immediately concern us, to know them; and chiefly becauſe, by knowing its Compreſſure, Weight, Reſiſtance, Motion, *&c.* we cannot alter them: So when a Ship or Body is ſupported by the Water, and driven by the Current, or Wind, if we be in the Ship, we cannot perceive whether the Ship removes from other Objects, or they from it; if we be out of the Ship, we perceive the Motion of the Ship or Body; but in neither Caſe but little how the Parts of the Water, which ſupports, and the Parts of the Water or Wind, which drives, the Ship or Body, ſhift Places. Though the Parts of either of them are much more perceptible than the Parts of the Firmament, which act in chief in the ordinary Courſe of Action, becauſe 'tis of little or no immediate Uſe to the moſt of us to know: And the farther any Body is removed from us, we ſee it under a ſmaller Angle, which gives us a very unjuſt Idea of the Sizes of the Globes in this Syſtem, and of the Stars. Our Eyes are framed to give us Computations nearly true of ſuch Diſtances as are immediately neceſſary for us to know, but very uncertain ones of greater, or of very great Diſtances; and I have ſhewed, Glaſſes do not aſcertain them; ſo are our Ears for Sounds; And our Senſes have ſtill more uncertain and fainter Ideas about the Agent which moves the Planets, and more eſpecially of the Motions of the Parts of the Fluid, in which, and I think I may ſafely ſay, by which, they are ſupported and moved. For the Ideas of Bodies in Motion, and of their Motions, go together; ſo where the Bodies are ſcarce perceptible, their

Motions are leſs ſo, and the Agent which moves them is likely to be ſtill much leſs perceptible. Though the Parts of this Fluid, in Expanſion, and its Conſequence, Compreſſion, make us ſee, hear, ſmell, taſte, feel, move, &c. and perform every Action upon all the Fluids and Solids in this Syſtem, they, or their Manner of acting in their common Courſe, are hardly to be perceived.

As *Moſes* ſays, *Gen.* i. 6. And the *Aleim* ſaid, let there be an Expanſion——and let it divide——ſo the *Aleim* made the Expanſion, and divided —— ſo the *Aleim* called the Expanſion the *Names*. Hence the Subſtance of theſe are ſpoke of as the Eſſence of the *Aleim*, and the Actions of theſe, as the Actions of them, and *vice verſa*. So *Paul*, *Acts* xvii. 28. *For in him we live, move, and have our Being;* thus the Light expands, ſo Jehovah, *Iſaiah* xlii. 5. xliv. 24. expands; thus Light is the Gravitor, ſo Jehovah כבר Gravitor.

Theſe Agents, the Powers in them, and their Actions, are likened to them, their Power and Actions in another View, mentioned *Ecclaſ.* xvi. 21. *It is a Tempeſt which no Man can ſee, for the moſt parts of his Works are hid.* Ver. 26. *The Works of the Lord are done in Judgment, from the Begin-*

Beginning, and from the Time he made them; he diſpoſed the Parts thereof; he garniſheth his Works for ever; and in his Hand are the chief of them unto all Generations. They neither labour, nor are weary, nor ceaſe from their Works; none of them hindereth another, and they ſhall never diſobey his Word.

And I think, with Submiſſion, I may ſay, God has choſen the ſmalleſt to Appearance, and in our curſory Judgments, the moſt contemptible Means to effect the greateſt Ends, and which bring thoſe Ends about almoſt imperceptibly, not only in the inanimate Parts of the Creation, but alſo in the Vegetable and Animal; perhaps that we ſhould not aſſign the Actions to the Agents, or Means employ'd; perhaps to humble our Pride; perhaps to quicken our Application, and upon the Diſcovery or Contemplation thereof, to reward us with higher Ideas of his Wiſdom, Power and Goodneſs: And I think I may add, that God has in a Degree ſuited to our State of Trial, limited us from ſeeing, or himſelf from ſhewing his great Works, and thereby his Power and other Attributes, without our diligent Search, that we might not continually, againſt our Wills, be forced or frightened into our Duty, but drawn by the Cords of a Man.

And if God has created, and ſo formed and diſpoſed the Parts of Matter, which may be ſeen, perceived or underſtood, and made them the Means that they may act upon others, and perform the Operations to be performed in Nature, his Wiſdom will be more evident to our Capacity, than if he exerted his immediate Power upon each Part, or acted upon each by his immediate Power continually, and his Power will not be diminiſhed thereby: And as the Knowledge of theſe Things doth not ſufficiently ariſe from immediate Ideas impreſſed by our outward Senſes, we muſt try to view Matter with other Eyes, and in another Light, in order chiefly to diſcover what material Darkneſs and Light are, how Light is produced, what they do, *&c.* becauſe neither of them, nor any other Matter, can give any clear Ideas of them, or of their Actions, by any of our outward Senſes.

Brutes have no other Conception, but by material Impreſſions upon the Parts of their Bodies deſigned for thoſe Uſes, and the Body of Man perceives only by his Senſes, and thence ariſe the firſt Ideas of Matter: But Man reaſons of Powers in an Agent, without any compleat Idea of the Agent, of the Accidents which can befal

Matter after the Ideas are loſt by the Greatneſs of the Body or Smallneſs of the Parts, or after the Bodies are out of the Reach of our Senſes by Diſtance, or incloſed within other Bodies, of Animals, the Globes, or, &c. which is a Proof there is an Agent in Man, that ſometimes uſes not, nor needs viſible Objects for preſent Ideas: But I hope I need not go about to prove, that we have in each of us a latent Power which is of a manly Principle, doth not much regard or conſider the Ideas from outward Objects which are ſtrongly impreſſed upon our outward Senſes, and repreſent Things which immediately concern us, to ſupply the Neceſſities of our Bodies, but is deſigned to be employ'd ſometimes upon more noble Objects, often to more noble Ends; which can by Contemplation, ſerious Application, and regular Deductions from the gentle Ideas we have of Matter and Motions, which do not much affect our outward Senſes, frame comparative Ideas, and make us underſtand ſo far as is neceſſary, or in ſufficient Degree, what God has revealed to us about Matter and Motion, diſcover him and his Attributes by thoſe Works, particularly in thoſe great Actions upon which our very Beings every Moment depend, which Men ſeldom regard or conſider, and in performing of which they have no Share.

Pardon the Digreſſion. If a Man for Diverſion by Legerdemain move Bodies quicker than our Eyes are uſed to trace Things, and pretend to ſhew and make the Mob believe that by hard Words and hidden Powers, ſome of thoſe Bodies pervade and paſs thro' Solids, become more or fewer in Number, are metamorphoſed out of one Sort into another, *&c.* though each remain the ſame, and of the ſame Magnitude: Does any one, preſent, who can and dare uſe his Reaſon, conclude it muſt be ſo? No, he compares the other conſtant Obſervations he hath made, with what appears to his Senſes, obſerves him more narrowly and detects the Fraud, or declares his Senſes impoſed upon in thoſe Particulars, and their Evidence to be falſe, and determines that the Bodies were ſhifted through Fluids, ſome taken away, ſome added, ſome changed for others by Means and in a Manner which his Senſes did not perceive.

If God for the wiſe Ends aforementioned, employs an Order of the ſmalleſt Atoms or Bodies in Form of a Fluid, as Means to move other Fluids, ſolid Maſſes or Globes, which by the Smallneſs of each of their Dimenſions, Figure, Fluidity, or Swiftneſs of their Motion, act in ſuch Manner that they evade our Senſes; and thoſe who pretend to deſcribe the Means and Manner of the Motions of thoſe other Fluids, ſolid Maſſes, or Orbs, be ignorant of, or hide the true Means or Manner, and ſay that thoſe Fluids, ſolid Maſſes or Orbs, are moved by Powers communicated from an Agent after its Action is ceaſed, by Laws not revealed, by Powers without Means to execute thoſe Actions, as has been ſufficiently hinted already; and ſtrive to dazzle the Eyes both of our Senſe and Reaſon with falſe Lights and falſe Evidence, and repreſent even Light itſelf in various and falſe Colours, that we may not ſee their Tricks and dark Practices, as Jugglers always do: Shall we depend upon our Senſes or their Words, as the Mob does, and conclude that the Author of Nature cannot uſe Means which can eſcape our Senſes, and that theſe Motions of the Globes, *&c.* muſt be performed by hard Words, and after an impoſſible Manner? Shall we let them treat us like Mob, and ſhall we act ſo? Shall we not exert that noble Principle in us, make Uſe of our Reaſon, compare our other conſtant Obſervations, conclude theſe Jugglers impoſe upon us, look for better Information, and by Means thereof endeavour to ſhew how thoſe Motions are performed. Let us try what we can diſcover thereby.

I borrowed this and the next Paragraph, inſerted in the ſecond Part of *M. P.* p. 52. I muſt repeat them. By the Power of God, the Matter of the Heavens and the Earth was created and exiſts; and by what I can gather from Scripture and Obſervations, in an immenſe, though determinate Number of Unites, and that each of them exiſts after a Manner we call Solidity, whereby each Unite is poſſeſſed of its Part of Quantity or Space deſcribed by its Figure, and limited by its Demenſion or Extent, and thereby is impervious and inflexible; has no other Qualities, Virtues or Powers, nor no Inclinations, neither external nor internal, appurtenant, infuſed or annexed to it, nor iſſuing out of it, but is wholly paſſive, and liable to external Accidents, ſuch as reſting upon one another, being moved by one another, and being reſiſted by one another, and being rubb'd againſt one another in paſſing by one another, adhering to one another, and being diſſolved, or divided from one another, and changing Places with one another.

Thoſe Unites adhering in certain large Maſſes, in certain Forms, are called Solids by certain Names, as the Earth, the Moon, *&c.* and the Parts of the Earth, as Stone, Gold, Silver, *&c.* Thoſe which do not adhere, or but ſeldom ſave only in very ſmall Maſſes or Grains, are called Fluids, and are of ſeveral diſtinct Species, as Water, Air, *&c.* And Unites diſperſed in them, which when collected, form Vegetables and Animals. Every Maſs when formed, and every Maſs now, has a certain Number of thoſe Unites or Parts, in it, and the ſeveral Parts of each Species of Fluids have the reſt; each Species of Solids, and each Species of Fluids hath its determinate Number, and there is the ſame Number in all now, as was created.

Our Idea of a Body at Reſt, ariſes from the Reſiſtance it gives to ſome of our Senſes by the Parts of our Body, or by the Medium which touches it and ſome of them, and is in Proportion to the Dimenſion of its Surface, which by reſiſting, is perceived by ſome of our outward Senſes with Allowance for the Diminution, which Diſtance makes or ſeems to make.

Any Body which is ſo ſmall as to lodge in, or paſs the Interſtices, between the ſolid Parts which compoſe the Organs of our Senſes, or ſhelters itſelf between thoſe of other Solids or Fluids, or is as ſmall as the Parts of the Medium by which we ſee, cannot be perceived.

One of thoſe Unites is ſo ſmall, that it is not to be perceived by any of our outward Senſes, as an inviſible Indiviſible; therefore we can have no Idea of one of thoſe Unites from any of them.

If we can have no Perception nor Idea of one of thoſe Unites from our outward Senſes, we can have no Idea of the Manner in which it exiſts, nor no compounded Idea of the Unite with its Accidents from them.

But Numbers of thoſe Unites adhering in Maſſes, or adjoining in Fluids, are perceived by ſome of our outward Senſes; thoſe adhering in Maſſes, or which form groſs Fluids at reſt, reſiſt, and form diſtinct Ideas; thoſe which form the fineſt Fluid, even thoſe which pervade the Pores of the hardeſt Metal, and the Space they enjoy is termed a *Vacuum*, when put into Motion, are to be perceived by our outward Senſes, nay will divide the Parts of the Organs by which we perceive; which by Compariſon proves the Exiſtence of thoſe Unites, the Manner how they exiſt, and their Accidents. This is the higheſt, nay laſt Degree of Senſation here; and from this, the Idea of the Sufferings of thoſe who refuſe the Evidence offered by the Idea conveyed emblematically by the *Names* is taken; and if this were not ſufficient Evidence, we ſee thoſe ſmalleſt Parts in Motion can divide the Atoms or Parts of thoſe Solids which are the hardeſt, or have what is called the greateſt Degrees of Adheſion.

So if the Parts which compoſe a Maſs or a groſs Fluid, by reſiſting and refuſing to admit other Bodies into the Space they enjoy, diſcover Solidity, or if a Maſs, Grain, or Fluid, ſuppoſe even of Grains of the fineſt Fluid, which will not paſs the Pores of Glaſs or Metal, and ſo are capable of being incloſed or confined, by being themſelves reſiſted by a Series of other Matter, which reſiſts, or refuſe to let them yield their Places, and take new ones, and they thereby reſiſt, or refuſe to give their Places, and take new ones, they prove there are Unites which compoſe that Maſs, or that Fluid, which exiſt, and are ſolid; and if they are ſolid, they will be liable to the Accidents aforeſaid.

Whether the Matter contained in each Unite be the ſame, we cannot perceive, nor cannot conceive how there can be any Degrees of Solidity or Difference in two ſolid Unites, each of the ſame Figure or Dimenſion; or in Solidity, between two of different Figures or Dimenſions.

But we can conceive, and comparatively perceive, that the ſeveral Sorts of Maſſes, and the ſeveral Sorts of Fluids, each of which we call by a different Name, may each be conſtituted of Unites, each Unite of each Sort of ſuch a particular Figure, or particular Dimenſion, as may make each Sort of Maſs or Fluid differently, or more or leſs liable to ſome one or more of the aforeſaid Accidents, which every Sort of Matter is liable to; that is, that the ſolid Atoms of each Species of Fluids or Solids are each of a peculiar Size and Figure, and that from the Difference in Size and Figure, they have their ſeveral Capacities, of being kept looſe or fluid, of adhering or being ſolid, of their different Degrees of Fluidity, Hardneſs, Softneſs, Ductility, Flexibility, Frangibility, *&c.* and that the Unites of the ſame Sort, by being differently ranged or diſpoſed, or by adhering one by one, or adhering firſt into ſmall Maſſes, and thoſe ſmall Maſſes afterwards adhering and forming large ones; or in Fluids, by each Unite continuing looſe, or by their adhering in ſmall Maſſes,

&c. may make the ſame Maſs, or the ſame Fluid, liable to different Degrees of the ſaid Accidents, by which, and ſuch like Differences, each Sort is diſtinguiſhed, and each Sort anſwer their reſpective Ends.

And we find thoſe Unites are formed ſo, or are ſo ſolid, that thoſe which compoſe thoſe Sorts of Maſſes or Fluids we make moſt Experiments upon, and are capable of being ſeparated and recollected, wear not by Friction, but preſerve their Figures or Dimenſions, which enable each Sort of them to be reformed into the ſame Species of Maſſes or Fluids, which gives a reaſonable Proof, that the reſt of the Unites, which conſtitute other Sorts of Maſſes or Fluids, retain theirs.

I muſt put a Caſe which I have no Idea of by Senſation, and ſo to me is Nonſenſe, in order to be underſtood. If one could have an Idea that empty Spaces could negatively ſubſiſt between Parts of the Surfaces of the Unites of the ſmalleſt Sort, and between Parts of their Surfaces, and Parts of thoſe of larger Sorts, when they adhere in Maſſes, where though ever ſo much compreſſed, we cannot conceive how they can touch in every Point; then the ſmaller the Maſſes compoſed of the

Unites are divided, and the more the Parts of the Maſſes are moved, in being divided in progreſſive Motion, or in the Precedence of the larger, and Recedence of the ſmaller in any determinate or limited Place, one would have a negative Idea that there would be leſs Matter and the more empty Space in that Place: Or that the ſame Matter would fill or poſſeſs the ſame Place, and leave more empty Space between its Parts: and ſo extend beyond the Dimenſion of the Place in ſome inconceivably ſmall Proportion.

But if the ſmalleſt Sort of Unites come ſo near our Definition of a Point, that in an infinite Compreſſure they touch in every Point, not only of one another, but of all other Sorts: Or if Matter be poſſeſſed of all the Space in this Syſtem, the Parts of a Maſs or Body when divided, take not up a larger Space than the Body, when the Parts were adhering, took up; and the Intervals, be they ſmall or great, at leaſt thoſe larger than one of the ſmalleſt Sort of Unites, muſt be filled with other Matter; and what they call a *Vacuum*, muſt have as much Matter in its Dimenſion, as if the ſame Dimenſion were filled with a Diamond, and its Pores with Atoms of the ſmalleſt Order. This is what the Scriptures call full; and as Senſe can have no Share in the Diſpute, every one that will imagine, may imagine which pleaſes him.

And ſince Solidity and Fluidity, in Compoſitions of Unites, are but Accidents, but comparative and temporary Terms, and that of thoſe termed Solids, ſome are more ſolid than others, and that of thoſe termed Fluids, ſome are more fluid than others; and that moſt, or all of the Sorts of Solids, can by the Motion and Intervention of the Parts of ſome of the Sorts of Fluids, become for the Time fluid, and upon the Ceſſion of that Motion and Retreat of the Parts of the Fluid, return to be Solids; and that moſt Sorts of the Fluids, by the Motion and Intervention of ſome of the Parts of the other Sorts of Fluids, can become more fluid; and upon the Ceſſion of that Motion and Intervention to a certain Degree, will become ſolid, and that the Parts of the moſt fluid Fluid, are more fluid, as they are more divided by ſome of its Parts in Action or Motion, and become groſſer or more united into larger Maſſes, as they are leſs acted upon or divided, by the other ſmaller Parts, and if that Motion ceaſed, perhaps would be ſolid: It follows, that the Maſſes or Unites of the moſt fluid Fluid, are poſſeſſed of all the Space or Interſtices between the Unites of all other Solids and Fluids, and that they in *Motion* can have Egreſs and Regreſs through between them, without ſeparating the Unites, or altering the Figures of the Solids, and without changing the common Degree of Fluidity in each Sort of Fluids, and as that Motion is increaſed, can widen the Interſtices, divide the Parts, *&c.* we muſt next enquire into the Cauſe of theſe Motions.

We have proved from Scripture (and as I was not then there, nor has any other given any other Account, it muſt ſtand) that this *Syſtem* is compoſed of created Atoms; that it is round and full from the Center at the Sun to the Circumference, and bounded there.

That the Atoms which compoſe the Heavens, *The Names*, FIRE, LIGHT and SPIRIT, are each of the ſame ſolid Subſtance, and of the ſame Figures and Sizes.

That theſe Atoms are the ſmalleſt, and from thence and from their Figures have the leaſt Capacity to cleave to one another, or be concreted; but as it appears they in ſlow Motion and great Compreſſure are alternately formed into ſmall Grains, and as the Atoms of any Size or Figure in Maſſes cannot form Pores that the ſame Sorts of

Atoms can pervade, ſo theſe Atoms being the ſmalleſt, cannot form Maſſes with Pores, that the ſame Size of Atoms can pervade; ſo while the Atoms in the Grains adhere, the Grains muſt be conſidered as Solids; and as the Unites have the greateſt Capacity to be kept fluid, ſo each to paſs between the Surfaces of others which are looſe, or between the Surfaces of the Grains formed of them.

That thoſe Atoms in the Action of Fire have the Capacity of ſplitting the Grains of thoſe which adhere, and putting them into the Condition of Fire, and of ſending them out in Light, and of pervading the Pores, and diſſolving the Adheſion of the Atoms of all other Solids.

That thoſe in Light have the Capacity of pervading the Pores of all other Fluids or Solids, except thoſe Pores in the Grains compoſed of their own Species of Atoms, (if they can be proved to be Pores) ſo are capable of keeping Fluids fluid, of expanding the Parts of Fluids or Solids, of being preſſed upon, and preſſing upon every Part of the Surfaces of the Atoms of Solids or Fluids, except upon the Points where thoſe Atoms which compoſe the Fluids or Solids touch each other.

That the Grains compoſed of theſe Atoms, and called *Spirit*, are ſo large, as not to enter the Pores of other Fluids or Solids, but are capable of being preſſed againſt their Surfaces or Faces; each of reaching over a Pore, and preſſing upon ſeveral Atoms at once; ſo jointly of preventing the Atoms of other Fluids from exhaling too much, and the Atoms in the Surfaces of Solids from mouldering; ſo of compreſſing the Surfaces of Vegetables and Animals; ſo of being puſhed, puſhing upon the Surfaces of thoſe of its own Fluid, and of thoſe of other Fluids and Solids, which I have called Impulſe.

We ſuppoſe, that at firſt the *Aleim* formed, put and kept the *Spirit* and *Light* in Motion, by their immediate Power; and that during the Formation of the Machine, *The Names*, this Fluid was called, the Firmament, the Expanſion; and after it had ſeparated the Waters, and formed the Earth, they called it, *The Names*; and they by thoſe under that Denomination carried on, and finiſhed the Formation.

Philo, *p.* 416. " Since it is created, and one, it is very likely that the particular Sorts of elementary Subſtances are ſubject to the Heavenly Agents, whoſe Effects they are, as is the Caſe in Bodies united together, that they contribute to each others Continuity. *P.* 507. "The reſt are void, or empty, by their own Nature, which if they have any Thing ſolid in them, owe it to their being bound together by the divine Word; for it is this by which every Thing is chained, or as it were glued together. A live Coal is Fire in earthy Matter, which by a Sort of Spiritual Habit (or Condition) pervades even to the Extremities of the Univerſe." *Philo de mundi Opif. p.* 9. "And let them be aſſured of it, and for the future fetch it from the Will of the heavenly Father, as oft as he pleaſes, without waiting for the Good-Will of the Heavens, whom he has given ſome, but not an abſolute Power to; for He, like the Charioteer, holds the Reins, or the Pilot the Helm, and directs every Thing, without any Aſſiſtance, in its right and ſtreight Courſe. *P.* 1152. This Law extending from the Center to the Circumference, and back again from the Extremities to the Middle; Nature runs as were the never ending Courſe of the Circus, joining and binding together all the Parts of the World; for the Father himſelf who begat made this, the uninterrupted Chain of the Univerſe." *P.* 1154. "God hath made the *Habit*, the moſt ſtrong

Bond of Stones, of Trees, and this (Habit) is the Spirit, which turns back into itſelf. It begins at the central Parts, and tends outwards to the Extremes, and when it is got there, it turns back again, till it come to the ſame Place it ſet out from, and this is the circular Courſe of the *Habit*;" So *Job* xxvi. 6. *Extending the* Covering upon the Abyſs of fluid Matter *and hanging the Earth upon* בלימה the Conſtriction.

And we ſuppoſe that *Jehovah Aleim*, by their immediate Power, put ſuch a Quantity of Atoms in the Action of Fire at the Sun, as would divide thoſe of the Spirit driving in: Such a Quantity of Atoms in the Condition of Light irradiating in ſtreight Lines from the Center at the Sun to the Circumference; and ſuch a Quantity of Grains or Spirit formed ſuch Atoms, concreted or adhering at the Circumference, and irradiating from thence into the Fire at the Sun, that as the laſt two, the Light and the Spirit, paſs oppoſite Ways, ſo thoſe of each Denomination, between thoſe of the oppoſite Denomination, each ſtrives to preſs thoſe on each Side ſideway, and that makes the whole form an Expanſion; that they thus ſet forward, continued thoſe Actions, thoſe Motions, and thoſe Effects.

That theſe Atoms and Grains which ſucceſſively and alternately compoſe this Fluid, *The Names*, after it was ſo ſet forward, became a ſelf-moving Machine, mechanically active; and that the Matter of all other Fluids and Solids are inactive and paſſive, and ſubject to *The Names*.

That this Fluid keeps itſelf in a perpetual Irradiation, or Circulation, at, to, and from the Orb of the Sun, and to and from the Limits, or Cirumference.

That the Spirit, which is compoſed of Grains, and each of them of concreted Atoms of Light, is continually preſſed and driven from the Circumference to the thineſt Part of the Fluid, to the Fire at the Sun, melted or divided into Atoms, and preſſed out in Light, to the Circumference, to be reformed into Spirit, to ſupport the Circulation.

This Irradiation, which is viſible through Teleſcopes, beyond the Surface and Atmoſphere of the Earth, by its Vibration, cannot be perceived here ſo plainly as there, becauſe only the Light irradiates againſt the Surface of this Orb next the Sun, and the Spirit does not return from the Circumference regularly, or in ſtreight Lines to the Sun, but returns to the oppoſite Side of the Earth; and the Light cannot

not meet, and paſs through the Spirit; nor is it much perceived in the Diſk of the Earth Morning and Evening, becauſe of the Motion of the Fluid, which drives and is driven by the Earth. But every thing here is acted upon by that Compreſſion which ariſes from the Irradiation. The Difference in Day and Night, Seaſons varying in the Condition of the Fluid, and in its Effects upon other Things, as appointed.

The Light which ſtrikes againſt this and the other moving Orbs in going out, and the Spirit which ſtrikes againſt them in going inward, and the Spirit which purſues thoſe Orbs in Motion, ſo are diverted from the Lines of Irradiation, as they are ſucceſſively left behind, reaſſume, or are carried on in their reſpective Courſes.

That theſe three, *Fire*, *Light*, and *Spirit* were not only called *The Names* by the *Aleim*, but were appointed Rulers, Subſtitutes, and Repreſentatives of their Perſonality, mechanically to act upon, and govern the other Matter, inanimate and animate, in this Syſtem, as their Principals, whoſe Names they bear, do in a higher Senſe, and each to act the Part of him, it repreſented, though the Light was appointed chief Ruler here, as I have ſhewed at large in the ſecond Part of *M. P*.

In Points where the Evidence is underſtood, Propoſitions about thoſe Points are eaſily underſtood; in Points where the Evidence has been neglected, and is not underſtood by others, 'tis difficult for any one who underſtands them to reduce them to Propoſitions which will be underſtood by others, 'till the Evidence be firſt ſettled; yet nothing will pleaſe now but in that way of Writing.

In ſuch a complicated Affair as Philoſophy, or Religion, Propoſitions are ſafer drawn from the Things ſtated, than they can be laid down before they are ſtated. Propoſitions about the Actions of this Machine, where ſeveral Agents act, where ſeveral Patients are differently modified, ſo as the Agency of the Agents will be varied, though true in groſs, will not be made fully, determinately expreſſive, without a vaſt Number of Limitations or Exceptions to each.

That we may not differ about Words, the Scriptures have furniſhed us with a proper expreſſive Name for every Agent in each of its Action. They call the Matter of *The Names* in Grains, which cannot pervade Pores, רוח *Spirit*; that Matter, in Atoms, or which can pervade Pores, when it gives Senſation to the Eyes, is called אור *Light*; when the ſame Matter expands, 'tis called רקיע the *Expander*; when it compreſſes, and ſo gravitates, 'tis called כבר the *Gravitor*; and ſo other Names for other Actions, to diſtinguiſh what the Matter is.

I call the Grains of this Fluid, *Spirit*, whether they be irradiating from the Circumference, or in that Motion we call Wind, or puſhing, or only compreſſing upon the Surfaces of Bodies or Fluids, or mixed in the Atmoſpheres. *Job.* xli. 7. *Cloſe as a Seal preſſeth; one approaches the other, and* רוח *the Spirit cannot come in between them.*

I call the ſeparate Atoms of this Fluid, *Light*, whether they be irradiating from the Sun or Fire, or in that Condition or Motion which gives the Senſation of ſeeing, which can pervade the Pores of ſolid Bodies in ſtreight Rays, as through Glaſs, Diamonds *&c.* in Form of Light, or through the Pores of other Bodies obliquely, without giving that Senſation to the Eyes, or mixed in the dark Atmoſphere, or in the Pores of Fluids or Solids, and expanding or compreſſing the Atoms of them. I need ſay nothing now of the

Parts of this Fluid in Fire at the Sun, becauſe they act not immediately here.

The Preſſure of a Fluid, whoſe Parts are of equal Size and of equal Height, upon any Surface in the ſame Poſition will be equal or proportionable to the Diameter or Area of the Surface.

The Parts of this Fluid compoſed of Atoms and ſuch ſort of Grains, of different Sizes, will preſs with each Sort of them in Proportion to their Sizes.

The Proportion of Preſſure upon Surfaces naturally holds from the Area of the Diameter of a Yard to a Foot, to an Inch, to that of an Atom, to the different Sizes of Atoms in ſome Proportion, with Allowance for the Difference of the Preſſure upon thoſe Spirit comes at, and thoſe which only Light comes at.

The *Aleim* made the Spirit the Inſtrument of Impulſe, *Gen.* i. 2. So *Exod.* xv. 8, 10. and the Light the Ruler here: And all the Divine and Heathen Writings attribute, the Divine in a mechanical, the Heathen in a higher Senſe, all the natural Actions to them; ſo whatever the Spirit could not do, where-ever there was Action, even to a Point where the Spirit could not enter, or be preſent, that muſt be performed by that Agent (which nothing but the Subſtance of an Atom can exclude) by the Light, and ſo was attributed to it.

The Appointment of the Spirit was to be the Inſtrument of Impulſe, firſt upon the Faces of the Waters, on the outward Face of the Sphere, and on the inward Face of the hollow Sphere of Waters, whoſe Pores were then as wide as the Pores of moſt of the Fluids and Solids, whoſe Atoms were then contained in the Waters; and conſequently, as the Spirit could not then, ſo it cannot now, act in the Pores of the Fluids or Solids; acting within the Pores, and upon the Atoms of Fluids and Solids, was given to the Light, which entered and acted then, and enters and acts in thoſe of any Sort. So thoſe which cannot pervade the Pores will preſs on the Surfaces, and thoſe which can prevade the Pores will preſs upon the Surfaces of the Atoms in every Point where they do not touch each other, and there with each other.

The Spirit acts upon the whole Extent of the Surface of a Body, upon the Atoms and the Spaces or Pores which it cannot enter, as far as its Parts can touch; the Light only upon the Parts of the outmoſt Surfaces of the Atoms where the Spirit doth not touch, and upon the Surfaces of the Atoms of the next Courſe or Order in Succeſſion, which, as one may ſay, form another Surface; ſo upon the next Order, ſo on quite through every Surface or Order in the Body, and ſo upon the Surface of every Atom in the Body on every Point, except where thoſe Atoms touch one another.

The Parts of this Fluid differ from the Parts of all other Fluids and Solids in this, that by their Unites being ſmaller then the Pores between thoſe of the Unites of any other Species, that not one of them can be ſeparated or divided from the reſt of its Species, ſo thereby it ſupports every one of its own Parts, or itſelf and all other Matter in it, but preſſes upon Parts of itſelf or others, more or leſs, by Rules already hinted at.

When this Orb was a Sphere of Water mixed with Atoms for Solids, including an Orb of Spirit or Darkneſs, and atmoſphered by Spirit from its Surfaces to the Circumference of this Syſtem, nothing ſtirred; when Part of the Spirit or Darkneſs was formed into Light, Motion commenced, and Separation and Formation enſued.

Irradiation, or the Manner of the Motion of Spirit and Light, is not then mentioned, but the Expanſion, which is the Effect of Irradiation, or ſuch Motion;

and with Reſpect to the Circumference of this Syſtem, the Light expanded the Spirit outward; with reſpect to the Orb incloſed within the Sphere of Water, they expanded outward; with reſpect to the Atmoſphere which included the Sphere of Water they expanded, and ſo compreſſed inward.

No Atom can alter its Figure or Size, or take up more Space; but the Atoms and Grains in the Irradiation attempt to expand, as working Drink, when the Veſſel is full, or Steam of Light iſſued from Fire, and detach'd Atoms of Water, when 'tis iſſued into, and has filled a Veſſel, ſo lay a Preſſure upon every Atom of themſelves, and upon every Atom within them, and againſt every Part of the inſide of that groſs Fluid which bounds the Circumference, or upon the inſide of a Veſſel.

When the Light began to raiſe an Expanſion in the Spirit without and within the Sphere, the Spirit was, as it is expreſſed *Job* xxxviii. 9. *When I made the Cloud the Garment thereof, and thick Darkneſs a Swadling-band for it.* The Spirit could confine the Water from incroaching upon it, inward or outward, ſo that it could neither deſcend nor aſcend; and it could afterwards aſſiſt in turning the Sphere;

but it could not enter into the Pores of the Waters. It, by poſſeſſing its Part of Space, could aſſiſt in the Expanſion, and help to lay a Streſs upon the Light, which pervaded the Pores of the Waters. But the Precept was to the Light, to expand, enter, and act in the midſt, among, between every Atom of the Waters, and to make מבדיל a Place, here a Sphere, a Diviſion between the Waters to the Waters; in ſhort, to form all the Parts of the Shell of the Earth.

Sorting the ſeveral Species of Atoms, which by their Difference in Size and Figure, make them fit to form Stones, *&c.* for ſeveral Uſes, making the ſmaller recede, and the larger accede, and form into Sands, Grains, Plaits, *&c.* by its Compreſſure, as Hail-ſtones, Snow, *&c.* are formed in the Atmoſphere.

Sinking thoſe Grains of the largeſt Atoms, and making the lighter or ſmaller with the Water riſe upwards, as appears in this preſent Shell, and of Courſe from below, from the Expanſion within, making the Grains of the ſmaller Atoms deſcend with the Water, and raiſing the larger upward, and with them forming ſolid *Strata* of diſtinct Sorts of Stone, and as far as we can ſee, or ſink between thoſe forming *Strata* of Coal, Chiver, Chalk, Clay, &c. whoſe Atoms are ſmaller; ſo of a far leſs, as they term it, ſpecifick Gravity. Forming the ſeveral Sorts of Nodules of Flint, of Iron, &c. moſtly approaching round, which are found in thoſe *Strata.*

Contracting and cracking the *Strata*, driving the Atoms of Metal horizontally, with the remaining Water, into the Fiſſures, and forming thoſe Atoms into Ribs, Maſſes, &c. of Oar, forcing the Waters above the Shell down, and ſo forcing the Spirit up out of the Abyſs, forming the Surface of the Earth, and many more minuter Actions were performed by this Agent the Light.

This was the Inſtrument by which the *Aleim* accompliſhed this great Work, ſo ſurely it may be able to keep Things in Order, form ſmall Productions, &c.

'Tis evident to me, from the Obſervations I have made upon the Parts of this Earth, as they are diſpoſed from the ſecond Formation after the Flood, which has taken up ſeveral larger Tracts than this to deſcribe them, that if the Spirit had not preſſed upon every Part of the inward and of the outward Surface of the Sphere of Waters, and the Light had not preſſed upon the Surfaces of each Atom in every Poſition from the Time they were at Reſt, while they were in Motion, till they were fixed, and after that with ſome Degree of Abatement, in Proportion to the Diſtance from each Surface of the Sphere, the reſpective Species of Atoms, and ſo of *Strata*, Nodules, Minerals, &c. could not have been ſorted as they are, nor could the *Strata* have been formed ſolid, nor could any of even the more minute Accidents have been performed by theſe Agents.

When this Shell or Sphere of Earth was formed, the Waters above it carried down into the Abyſs, and the Mixture of Spirit and Light brought up and mixt with the reſt, with ſome floating Atoms or Vapours of Water or fluid Matter, and of vegetable or dry Matter, which riſe and hover near the Earth and fall, they poſſeſſed all the Space from the Surfaces of the Orbs to the Circumference; and the Mixture of Spirit and Light together, with the Fire, became a Machine, and the whole Mixture became an Atmoſphere to this, and ſoon after to each Orb, and ſo in Proportion to every Body which has been ſeparated from this Orb, or formed out of it. But as each Orb or Body interrupts Part of the Preſſure of this Fluid, the groſſeſt Grains would be ſucceſſively driven to the Surface of each Globe or Maſs, and form what they now call an Atmoſphere; and by the Rules aforeſaid, the largeſt neareſt the Surface, and by Degrees ſmaller and ſmaller to the Verge of each Atmoſphere; to be ready for their ſeveral Uſes; and conſequently a leſs Proportion of Light in each where the Fluid is thinneſt, that is, has the greateſt Proportion of Light in any given Compaſs near the Surface of an Orb, the Spirit in the Vicinity being more preſſed, and leaſt on the Side next the Light is driven in, drives it out and takes its Place, or mixes with it: And as each turning Orb interrupts the Light from the Sun by a Hemiſphere in ſucceſſive Rotation, the adjoining Spirit ſucceſſively preſſes in upon the hindmoſt Edge, and continues the Rotation and Progreſſion, as I have at large ſhewed.

No other Machine has the Power in its ſelf: Wind-Engines are moved by the Spirit, Water-Engines are moved by the Action of this upon the Waters, Steam-Engines are moved by the Force of the Light upon the Vapour of Water one Way, and by the Preſſure of the Spirit the oppoſite Way. This communicates the Force to Animals to move the Machines moved by them. This Machine, *The*

Names, has the Power to move itſelf, and move that which moves others, and all Things which move, or are moved in it. This is, or theſe are the מלאכת the *Agent*, רקיע the *Expander*, שחקים the *Strugglers*, צבאות the *Forces*.

The Power or Compreſſure of this Fluid, as a Machine, is exerted in every Point of its ſelf, and upon every Point of the Surfaces of Bodies and Fluids, and of the Surfaces of every Atom which compoſes them, either immediately by itſelf, or by preſſing upon, and ſo with others where they touch it.

Every Grain, and every Atom of the Fluid which compoſes this Machine, is preſt upon by thoſe which touch it, in regard to its Tendency behind, and preſſes reciprocally upon thoſe it touches, in regard to its Tendency before of its own Species, or others, in Proportion to each of their reſpective Surfaces: The Spirit upon the Surfaces of other Bodies or Fluids, where it can enter, the Light in ſmall Grains or Atoms, from the Sizes of thoſe which will paſs the Pores of Wood, Metal, Glaſs, down to thoſe ſo ſmall, that they paſs the Pores of a Diamond, preſs upon the Surfaces of every Atom, in every Fluid or Body, as fully as if each Rank of

Atoms were formed into a ſeparate Plate, and diſtanced from each other, or were in looſe Atoms; and the Spirit and Light have the ſame Preſſure upon them too, within a Trifle, as they would have upon the Bodies ſplit into Plates, or reduced into Powder.

The Columns of Light, directly or indirectly, preſs upon every Part of the Surface of every Unite of other Matter alone, or which compoſes a Maſs or Fluid in every Direction here, as we ſay, downward, upward, horizontally, *&c.* except upon the Points where the Spirit touches, or where the Unites of other Matter touch one another, and there with theſe one another.

The Preſſure from that of the Spirit upon the Fire, and that of the Expanſion after, is continued upon the Light to any Depth in Fluids or Solids, and after it has paſſed through Shells or Spheres of both or either, tho' with ſome Degree of Abatement.

The Force of Light is ſtrongeſt, when it comes ſtreight from the Sun, and perpendicular to the Horizon, both in the Action of Pervaſion and Expanſion, and weaker as it comes more obliquely, to anſwer the Ends of Seaſons, *&c.* But my Deſign is to ſettle its general Power, before

I enter upon the Degrees of it; ſo *Pſ.* xix. 5. *thro' all the Earth does* קום *the Subſtance go.* And Ver. 7. ſpeaking of Light *and there is not any thing hid from* חמתו *its Heat,* (its Effects in Motion). So *Job* xxxviii. 14. תתהפך *it conforms as Clay* (Wax) *to a Seal, and* יתיצבו *they ſet themſelves as a Garment.* If the Atoms of a Body could be taken out or annihilated, and the Spirit upon its Surface and the Light within were made ſolid and could be ſeen, you would have the Figure of the Body, the Figures of all the Pores, and the Impreſſion of all the Atoms; becauſe the Fluid of Light is always in the Pores of all Bodies, the Preſſure of this Fluid ſliding or ſhifting upon the Surfaces of the Body at Reſt or in Motion, and ſo upon the Ends of the Columns of Light in the Pores, is not conſiderably altered, except in violent Motion of the Fluid or Body, which augments the Preſſure, or when you alter the Poſition of the Body, ſo that another Part tends to the Earth, or, &c.

Theſe Actions are here, as it is beautifully expreſt, *Eccluſ.* xxxiii. 15. *So look upon all the Works of the moſt High, and there are two and two, one againſt another.* In the Irradiation of the Agents, the Spirit acts againſt the Light, and the Light againſt the Spirit; but upon every Orb or Body, and every Atom in it, except the Sun, the Spirit, and Light, act in Conjunction in Expanſion, and preſs upon every Side, and ſo upon each oppoſite Side, two againſt two, both againſt both, and on which ſide ſoever the two are weakeſt, (whether from a leſs Proportion of Spirit, or the Vicinity or Interpoſition of ſome denſe Body, the Orb of the Earth, or, *&c.*) they yield, and the Body has Tendency or Motion that Way.

This Earth is now in a different State to what it was while it was forming, and would require ſome Compaſs to ſtate its preſent Situation and Condition, which is not before me now: But I think, if the Light did not, tho' with ſome Degree of Abatement of its Force, pervade this Orb, or re-act, which is much the ſame; and if the Strength of that Pervaſion were not increaſed by the Degree of Expanſion on the oppoſite Side, or the Reſiſtance weakened on the Side where it pervades, (ſo in ſome Places, and at ſome Times, more or leſs) the Gravity of Bodies would be much greater than it is, and many of the Phænomena in Nature could not be ſolved, particularly the raiſing of Vapours for Rain, *&c.*

If there had not been that due Proportion in Size or Figure among the Atoms and their Pores, that thoſe of the ſmalleſt Size or ſmall Grains of them could have paſſed between the Atoms of Solids or Concretes, the Compreſſure of *The Names* would have driven all other Solids, as well as Loadſtone, Iron, Talk, &c. together. Since the Earth was formed, theſe Agents have many other Things in Charge; and as CHRIST and LIGHT have each as many Names in *Hebrew*, as Offices, perhaps the Light, the material Glory, has almoſt as many diſtinct Offices in the material Senſe, as the Perſon it repreſents, without leſſening his Glory, has in the ſpiritual Syſtem. I have hinted at many, ſo I ſhall at a few here, *Iſa.* xlii. 5. *Who expands the Earth*, (Adamah and Water) *and its Products.* Ibid. xliv. 24. *I* Jehovah *who do all things; who extend the Names by myſelf, who expand the Earth* מאתי from my Subſtance, or my *Ath*. *Deut*. xxxiii. 13. *Bleſſed of* Jehovah *be his Land for the precious Things of the* Names, *for the Dew and for the Deep which coucheth beneath, and for the precious Fruits brought forth by the Light of the Sun, and for precious Things put forth* (Heb. thruſt forth) *by the Light of the Moon.*

The Expanſion of the Light of the Sun with Fluids, muſt be greater than the Compreſſure of the Spirit, or elſe Trees and Plants could not yearly ſwell or burſt the outer Bark, and extend in Diameter and Height; nor could the Bodies of Animals extend in Size.

The antient Heathens, who worſhipped theſe Agents for theſe Powers invented Inſtruments, and uſed great Application to obſerve the Motions of the Orbs, *&c.* the Effects of their Powers, and to examine, deſcribe, and extol their other Effects upon inanimate or animated Matter. In the common Courſe of Nature, theſe Agents were not intended to be viſible to Senſe, nor every minute Circumſtance to be underſtood without ſuch Application; ſo it had been enough for Believers to underſtand them in groſs, and to attribute the Creation, Formation, and ſo Powers, in them, to *Jehovah Aleim:* But as the Devil firſt, and the Heathens afterwards, aſſerted there were Powers in them which did not belong to them, it was neceſſary that *Moſes* and the Prophets ſhould exactly deſcribe what was in them, and how they acted, and ſo not only reclaim the ſuppoſed Powers in them, but thoſe which were really in them for *Jehovah Aleim*; tho ſome modern Diſcoveries, made without any ill Deſign, have ſhewed us the Power of theſe Agents, beyond what was known to the Antients, by what yet appears; yet there never was a Time before this, when theſe Agents and their Powers were diſputed, nor ever ſo much Application uſed to deface all Ideas of them, and of the Ideas they give us of thoſe they repreſent, and in doing that, they have made more Enquiries, tho' without Succeſs, after the real Cauſes of Things; and in attempting to prove the contrary, have ſhewed more Methods of proving their Exiſtence and Power, than any of the Moderns knew any Thing of.

Perhaps 'tis ſo ordered, that when ſome Men ſhould uſe their utmoſt Art to make other Men Unbelievers, that the Evidence which ariſes from ſuch Diſcoveries, and the Enquiries and Experiments thoſe Oppoſers have made, ſhould enable others to give Evidence ſufficient to confirm the Authority of the Scriptures.

Out of the infinite Number of Texts I have produced, I ſhall inſert a few Hints which mention theſe Agents, their Commiſſion, Actions and Effects; and to the infinite Number of Citations from the Antients, I ſhall add one or two, *Job* xxviii.

25. *To make the Spirit* משקל *the Inſtrument of* a ſmall determinate *Weight.* 2 *Eſd.* iv. 5. *Weigh me the Weight of Fire, meaſure me the Blaſt of the Wind.* Ibid. viii. 2. *Whoſe Service is converſant in Wind and Fire.* Judg. v. 31. *As the Shemoſh* (Light of the Sun, which the Tranſlators, as 'tis likely in the two next above, have generally conſtrued Fire) *which goeth forth in his Might.* Job xxxvii. 10. *The Breath of the Irradiator gives Froſt, and the Water is widen'd* (enlarged) *into a Concrete. Yea the pure* (Fire, which is clear) *tares to Pieces the condenſed* (or Grains) *and his Light ſcatters that which is compreſſed, and it is turned about by his Counſel, that they may do whatſoever he has commanded them, upon the Face of the World towards the Earth.* Job xxxviii. 7. *Who number'd the Ethers in Wiſdom? And the Defluxions of the Names who cauſed them to come down to melt the Duſt into Concretions that Maſſes adhere.* Ver. 33. *Knoweſt thou the Ordinances of the Names? Didſt thou ſet their Dominion over the Earth.* Jer. xxxiii. 25. *The Ordinances of the Names did I not appoint?* Pſa. cl. 1. *Render Irradiation to him, in the Expanſion of his Power.* Job xxxvii. 18. *The Ethers, ſtrong as a molten Speculum.* Pſa. lxviii.

35. *And it is his Strength in the Ethers.* Prov. viii. 28. *When he gave Strength to the Ethers above.* Pſa. lxv. 7. *Who framed the Mountains by his Strength.* xix. 7. *The Expanſion ſheweth his Handy-work.* Iſa. xlii. 5. xliv. 24. *Expanding the Earth, and its Products.* Pſa. cxxxvi. 6. *Who ſtretched out the Earth upon the Waters.* 1 Chr. xvi. 30. Pſa. lxci. 1. lxcvi. 10. *The World is machined; it ſhall not fail.* Pſ. xxiv. 2. *The Earth and its Fulneſs; for he has founded it upon the Seas, and framed it upon the Floods.* cxix. 90. *Thou haſt framed the Earth, and it ſhall continue.* Why cannot that which concretes Water, concrete the Parts of Solids? If the Firmament called *The Names*, the Æthers, that Matter in oppoſite Motion, be the Agents in which is the material Power of *Jehovah Aleim*, then he made the Mountains ſolid, firm by *The Names. Philo* 960. "What part of the Earth (to begin there) can be worn away or conſumed by old Age; Do not the hardeſt Stones (only) diſſolve or melt thro' the Weakneſs of their *Habit* (that which *holds* them) *which is the (Tenor) hold of an intenſe Spirit; a Bond not eaſily broke, however is broke at laſt.*" 1168-9. "Do not the hardeſt Stones rot (ſome fine Matter getting in and ſwelling them) when their

Continuity grows weak, the Spirit that holds them (which is a Bond, not invincible, how hard ſoever it may be to break it) letting go its hold; and then they reſolve into Duſt, looſe, incoherent, frail, and periſhable, and ſo waſte away and diſappear at laſt! He hath bound together the Stones and Trees when torn from their Beds, by the *Habit*, as it were by a ſtrong Chain; and this is the Spirit which returns into its ſelf; for it begins from the Middle, and reaches to the Extreams; and preſently after turns back its Courſe from the Circumference, till it reach the Place it firſt ſet out from. This is that *Habit*, and never ceaſing Running and Returning (*curſus recurſuſque*) which thoſe who run at the Games, every fifth Year repreſent, as ſomething worthy Notice and Imitation."

I ſhall not inſiſt upon any *Data*, nor upon any Deductions from them; but upon *Facta* which come under Senſe, and ſuch Deductions as inevitably follow from them, without leſſening the Authority of Scripture.

The expanſive external Preſſure or Compreſſure of the Spirit, or thoſe Parts which do not enter or pervade the Interſtices between the Atoms of a ſolid Shell ever ſo thin, if the Fluid were equal on each Side, and no Solid or other Fluid interpoſed on one Side, would be equal, above, below, downward, upward, and inward, on every Side. But if the Fluid be thinner, or there be a greater Proportion of Light on one Side, or, as the Caſe always is here, the Earth interpoſe on one Side, the Compreſſure is weakened in ſome ſmall Proportion on that Side.

If ſuch a Shell have an Aperture into it wide enough to admit the Spirit and Light, in Proportion to that without, when it is entered, if you ſtop the Aperture, the Mixture of Spirit and Light within, by the Compreſſure without, inward upon the Light in the Pores of the Shell, reſiſt and preſs outward, nearly as much as that without preſſes inward, ſo as the Preſſure or Force of the Expanſion from the counter Motion of the Spirit and Light without, inward, lies upon the Fluid in the Shell, thro' the Pores, in Proportion to their Wideneſs; when the Impulſe of Light without is increaſed by Motion, either from the Sun or Fire here, and that Light ſtrikes upon the Shell, it pervades, puts the Light within into Motion, drives out part, heightens the Expanſion within in ſome Proportion to its Quantity, Velocity, &c.

If you take off the Preſſure of the Spirit on any Part, inſide or outſide, by fixing a Veſſel, ſuppoſe a Cylinder, with a Piſton or ſliding Valve in the top of it cloſe to the Part ever ſo thin, and extract the Grains or Spirit out of that Veſſel or Cylinder, ſo that nothing but the Light which remains within, and enters to ſupply the Space of the Grains extracted, and the Preſſure upon that Light, with the Light through the Pores of the Veſſel inward, remains upon, and reſiſts the Part, at firſt Sight one might be ready to determine, that it appeared, that the Preſſure of the Spirit and Light on their Side, is greater than the Preſſure of the Light on its Side, by the Weight of a Column of Water, whoſe Baſe is equal to the Part where the Spirit was taken off, and whoſe Height is thirty odd Feet, and that by this we could eſtimate the Difference between the Preſſure of the Spirit and Light, and that of Light alone; where, by a ſliding Valve, the Spirit can drive it out upon any Area, even almoſt to that of an Atom; and that if we could take off the Light alſo on the under or oppoſite Side, we ſhould find what the Spirit and Light preſſed upon a Surface of any Area, as aforeſaid.

A Plate as thin as a Bladder, or Gold-beater's Leaf, if ſupported, ſtops the Pervaſion of the Spirit, and receives its Preſſure. If the Spirit acted upon the inner Surfaces, and for Example, a Piſton were of Wood, or any Matter hydroſtatically of the Weight of Water, a Board of an Inch thick would contain about 390 Times as many ſuch Plates or Surfaces: So about as many Times the Weight; and the Preſſure upon the Board, would be 40,000 or more Times its Weight, as no ſuch Preſſure appears upon a Piſton, where the Preſſure of the Spirit is taken off on one Side, 'tis plain that the Spirit only acts upon the Surface.

This goes near to prove what the Spirit and Light preſs upon a Surface; but it neither proves nor diſproves, much leſs any Way meaſures the Preſſure of the Light. For beſides the Preſſure of the Spirit and Light upon the Surface of the Piſton, as they do upon the Bottom and Sides of the Cylinder, the Light has as much Opportunity to pervade the Pores of the Piſton, as it has thoſe in the Cylinder; therefore the Light which pervades the Pores in the Piſton, equally oppoſes the

Light which pervades the Pores in the Bottom and Sides of the Cylinder, and the Force in the oppoſite Directions of the Light, oppoſe, and nearly equal each other. And the Preſſure of the Spirit, and even of the Light upon the Surface of the Piſton, has nothing to do but to drive out, or ſhift the Light out of the Cylinder, to let the Piſton ſlide down to the Bottom: Nay, as the Bottom and Sides, which have alſo the Preſſure of the Light upon them, do not move or oppoſe this, it ſhews not even how much of the Force belongs to the Spirit, and how much to the Light. And if the Force of the Light were taken off on one Side, we could aſcertain the Force of the Spirit and Light upon one Surface jointly, I am not ſure we could do it ſeparately, and perhaps we might aſcertain the Force of the Light upon a few Surfaces, but not its whole Force.

So where the Surfaces of two poliſhed Plates are put together, the one takes off the Preſſure of the Spirit on one Side, and the other on the other, and no more. The Force of the Compreſſure of the Firmament is not meaſured by this, but only the Difference which the Spirit, as an Atmoſphere, makes upon the firſt Surface of Bodies, Animals, Vegetables, Fluids, &c. to preſerve the Adheſion of the Atoms on the Surface of Things ſolid; ſo while the Light irradiates near perpendicularly from the Sun againſt the Surface of the Earth or Horizon, and expands ſtrongly near Mid-day, till that Part be turned off into the Spirit. As Light expands the Juices in Animals, and Vegetables ſo Spirit prevents them from expanding too much or burſting, the Surfaces of Fluids from evaporating too much, preventing too much Light from forcing into Fluids; ſo keeping them in a due Mixture, or Degree of Expanſion, &c. which, though imperceptible, appears, when 'tis taken off on one Side, as above. This Compreſſure is limited when the Shell is, and the Fluid is nearly at Reſt; and 'tis nearly the ſame, when the Shell is put into gentle Motion, or when the Spirit is put into Motion by the ſmall Difference that is made in the open Atmoſphere, by ſome adjoining Part containing leſs Spirit than there is there, and ſo in Proportion with the Advantage of its puſhing, which we call Wind. If the Difference in the Atmoſpheres were much greater, they would overſet all perpendicular Directions, root up the

Trees, *&c.* as appears by ſome late Inſtances in the *Weſt-Indies*; if the Preſſure were much greater, the Light and it could not alternately prevail in Seaſons, and all their Conſequences.

As the Title, ſo Intention of this is to ſhew the Agent, which is the Cauſe of Tendency or Motion; the Reaſons of the Degrees of Motion or Velocity is not under Conſideration, but that of over weighing, ſo Tendency or ſlow Motion.

It is plain that if you place a Plate of any Diameter, and ever ſo thin, even to that of a Goldbeater's Leaf, parallel to the Horizon, that the Spirit preſſes upon it with a Weight equal to a Column of thirty odd Feet of Water, whoſe Baſe is equal to the Area of the Plate; and if you weigh it in that Poſition in a pair of Scales, and after weigh it edgeways, the Difference will be ſo inſenſible as that it has not, that I remember, been taken Notice of. And as no ſuch Preſſure which is ſo much greater on one Side, and ſo no ſuch Tendency to a Point, appears upon thin Plates in the Air or at Reſt, it is evident that the Spirit ſupports very near as much on the low or under Side, and ſo is near equal on every Side. And if the Difference between Compreſſure

ſure of the Spirit and Light upon one Surface of Atoms downward, were ſuppoſed to be equal to the Preſſure of Light upon ſeveral Surfaces of Atoms downward, and ſo on the oppoſite Side or upward; yet as the Preſſure of Light is alſo nearly equal on a Body, Plate, *&c.* above, below, or downward, and upward, and inward, on every Side or Face of each of its Atoms, ſo is Compreſſure, and the Exceſs of that towards the Side on which the Preſſure is weak is Gravity, and the Effect Tendency or Motion; and as the Tendency or Weight of the whole ariſes from the Difference in Compreſſure upon an infinite Number of Surfaces, even in a thin Plate, the Difference upon the two outer and oppoſite Surfaces, muſt on a thin Plate be very ſmall, perhaps not the 1000th Part, and in a thicker Body imperceptible. So if extending ductile Matter into thin Plates, or if ſplitting a Body or Plate into ſeveral Plates, and making more Surfaces, ſo that the Spirit may have a greater Extent to act upon, do not conſiderably alter the Gravity, then there was near the ſame Preſſure upon the new Surfaces before they were made.

A Grain of the Spirit being impervadable till the Atoms be diſſolved by Fire or Colliſion; ſo here a Solid is preſſed upon, and preſſes upon any Solid, or &c. more than one perhaps, as much as ſeveral Atoms of Light; ſo every Grain in proportion and all together, near a Mean. As the Preſſure of the Spirit upon a ſliding Valve or Piſton, is in Proportion to its Diameter, the Surface of the Valve or Piſton being as a Solid impenetrable to the Spirit: And though I have ſaid above the Preſſure of the Light comparatively upon the Surface of an Atom is leſs in Proportion to the Diameter of the Atom, the real Preſſure of the Light upon each Species of Atoms, does not appear at firſt Sight; or by what I ſhall ſhew now, otherwiſe than by the ſtrict Coheſion of ſome Species; but only the Difference of the Preſſure or Gravity: whether the Difference be in exact Proportion to the different Power the Light has upon each Species, or whether the Light has Power upon each Atom in Proportion to the Extent of Surface or Figure, makes ſome Difference, is not now the Queſtion.

If the common Mixture of Spirit and Light be incloſed in a Veſſel, or the ſmalleſt Aperture be made into a cloſe Veſſel, wide enough to admit its Maſſes on any Side above or below, and Bodies of any Figure were incloſed in it, beſide what the Light does in the Pores of Bodies, the Spirit exerts or acts with all its Force outward, inward, and in every Direction, upon every Part of the inner Surface of the Veſſel or Shell, and of every thing contained in it, becauſe it is kept in on all Sides by the Atoms of the ſolid Sides, and is continually expanded by the Compreſſion of the Light within, upon the Lines of Light through the Pores; and if ſeveral Couples of poliſhed Plates be placed in it Face to Face, each of them will adhere with near the ſame Force as if they were each Pair in the open Air; if exhauſted Glaſſes, ſuch as would burſt in open Air, were exhauſted in it, the Compreſſure would burſt them.

If a round Shell ever ſo thin and cloſe were covered by another, and that by another *ad infinitum*, and the Spirit were exhauſted, one Tube, whoſe Baſe were but the Diameter of a Pin, put in from above or below, or any Side, through all the Sides, with an Aperture between every Shell, would let in the Spirit, and the Pores would communicate this Compreſſure of the Light to every Sphere inward and outward.

If a cloſe Veſſel were divided by Plates one below another, without Communication, except by a ſmall Tube as aforeſaid, the Spirit in the firſt would ſupport the Top, and that in the ſecond would ſupport the Bottom of the firſt upon the under Side, and ſo on: So what is called the Preſſure of the Atmoſphere, is properly and really Compreſſure, or otherwiſe there would be the Quantity of ſo many Preſſures in the whole; whereas in Truth there is but ſo many Differences of the ſeveral Preſſures.

If each other Diviſion were exhauſted and no Spirit left in them, and the Tube went through them without Communication, it would be the ſame; the one ſide would preſs, and the other ſupport near equally upon thoſe void of Spirit, ſo *ad infinitum:*

So Surfaces or Plates one below another, incloſed or not incloſed, do not multiply the Preſſures of the Spirit, but only the Differences of them, ſo do not increaſe the Weight of each Plate more than the Difference between the Preſſure and Support of the Spirit upon each.

So the Preſſure of the Spirit on the lower Inſides of a Veſſel, or upon other Veſſels within it, or when divided into Spheres or horizontal Diviſions upon them, will add little to their Weight; becauſe the Light which pervades from below, ſupports the Spirit near as much as that from above preſſes it downward: Where there is the greateſt Proportion of Spirit or the Grains largeſt, whether it be in the open Air or inclosed, and they driven nearer together by the Preſſure of Water, or be forced into the Veſſel, the Light attempting to paſs between them, produces the greateſt Degree of Expanſion. If that be in the open Air, and ſo leſs Spirit in a Veſſel, there it preſſes upon the Sides of the Veſſel, and prevails inwards. If that be within a Veſſel, and ſo leſs in the open Air, it preſſes with greater Force upon any thing within the Veſſel, and upon the inſides of the Veſſel, and prevails outward; ſo if one Veſſel be within another, that full of the groſſeſt prevails, ſo from the greateſt to the leaſt Proportion of Difference. And though the Grains are heavier than the Light, beſides that, as they by Expanſion preſs near as much upward as downward, this would make little more Alteration in the Gravity of a Veſſel.

Theſe Effects would hold in Proportion, if the Pores of ſeveral Shells were ſmaller and ſmaller, and the Holes to admit the Fluid could ſtop the largeſt Claſs of the Grains or Spirit, and admit the next Claſs; ſo each a Claſs ſmaller and ſmaller, till there would be no Expanſion. When a cloſe Veſſel is full of Light, each Atom of the ſame Size, and near the Size of what we call a Point, there are no Pores among them into which another Atom can enter, except others be driven in with Force ſufficient on one Side, to drive ſome of thoſe within out through the other Side. And though thoſe driven in take the Places of thoſe driven out, they cannot, like Wedges in entering and paſſing between others of this Size, make an Expanſion, as ſuch can do in entering and paſſing between Grains of Spirit; ſo though there can be no Expanſion, yet the Force of the Light without through the Pores lies upon it, and every Action performed by Light upon Solids will be performed there, and the Effects of its expanſive Force upon Fluids in Bodies will be greater there, becauſe the Reſtraint of the Spirit is taken off. Hence the moſt ignorant and the moſt arrogant of Men was forced to own, that this which he called *Æther*, reflects Light in common Motion more than the common Mixture of Air without: Others, that it pervades the Pores in Bodies ſts, freelier than it doth this their Vacuum, which indeed is looſe, and whoſe Parts can ſhift more freely.

No other Atoms can be formed ſo denſe, or with Pores ſo ſtrait as to ſtop the Perváſion of the Atoms of Light, but they will paſs directly or indirectly, except thoſe of their own Order congealed, which is ſaid to be the State of thoſe in the Circumference or Confines of this Syſtem, I think hinted at *Ecclef.* xvi. 16.

Though I have Evidence to Senſe, and ſhall give it to others what this Agent is, that it has theſe Effects, and can have an Idea of the Manner of its acting by one or a few Columns of it, yet the infinite Number of theſe Columns, and the different Ways they exert their Force, makes the Idea too complex to be conſidered at one View, and in that View inconceivable. But the Idea we can have ſuperſedes all Notions of occult Qualities, of which, for want of an Idea of an Agent, we have no Idea.

As Spirit let in at ever ſo little a Hole into a cloſe Veſſel, or what they call a *Vacuum*, preſſes upon every Part, and would preſs equally upon any Number of Piſtons, as if the Paſſage were ever ſo wide, by Reaſon of the different Sizes of its Grains, whereby ry Side, drives in the ſmaller between the larger, which act as Wedges to one another: So every Column or Line of Light which enters at, and is in the Pores of a Solid, be it ſtraight or crooked, will preſs equally upon any Number of Atoms, can be preſs'd as much behind, and can preſs as much forward, or have the ſame Force upon each part of the Surface of each ſucceſſive Unite of the Solid, except where other Unites touch them, as if each were of ſolid Diamond, and much more, becauſe by the Smallneſs, Dryneſs, or Looſeneſs of its Parts, it can act on each, not as a real Solid made with Branches to reach to each, would do where the Preſſure upon it would be communicated and divided among each; nor as Water does, where every Part preſſes upon, ſupports a Part of a Column in Proportion, becauſe there is only a certain Difference in Preſſure upon itſelf: Beſides, the Preſſure of the Spirit which lies upon the Bottom of any Thing which contains it, or upon any falſe Bottom, where its underſide, and the Surface of the Bottom are poliſhed and touch; but becauſe the other Columns of Light through the Pores of the Body on each and every Side, except where the ſolid Unites of the Maſs reſiſt, preſs, and ſupport each, in each Part with equal Force, and every Part of every Column of Light preſſes equally upon the Surface of every ſucceſſive Unite within the Lines of its Baſe, near as much as if it preſs'd upon no other but only one, till at vaſt Depths it abate by ſmall Proportions. When the Light is within the Pores of a Solid, while the Body remains ſolid, ſuppoſe the Atoms of Light only preſſing, and not in Motion, every Atom of the Light has its full Force from the Compreſſure of both Spirit and Light from without, inward upon the Surface of every Atom it touches, it cannot be ſo ſhifted or put aſide, but every Column in every Direction keeps it to its Point; nay, when they are ſhifting in Pervaſion, ſtill the ſucceeding ones are each ſucceſſively kept to their Points, to preſs where they immediately touch, by the Compreſſure upon every Line or Column, as aforeſaid. And its joint Preſſure with the Spirit upon the firſt Rank of Atoms, or its ſeparate Preſſure on the ſecond Rank, does not abate its Preſſure upon the third, and ſo on; only each Rank will contain fewer Atoms, as it lies nearer the Center, and each is counter-preſs'd on the oppoſite Side, that the Difference is only ſhew'd here. So the Surfaces of as many Atoms within a Body as compoſe the outward or upper Surface, have each the full Preſſure of the Spirit and Light upon them, as much as the ſecond Surface, or third, or, &c. and will be preſs'd with the ſame Force towards the Center, or ſome Part of the Body; and conſidering how the Area of each of the Surfaces or Courſes of Atoms towards the Center are leſs and leſs, ſo upon every ſucceſſive Rank inward, to the Center, or, &c. abating for the Abatement of the Diameter or Area of each Surface nearer and nearer the Center, as if they were ſplit and cut into Plates. And the Thickneſs of any Body, as far as Gravity can be of any Uſe, makes little or no Difference; for where the Parts of Light below a certain Size can paſs the Pores of the Body, they paſs and act at any Thickneſs, as freely as Light paſſes through thoſe Bodies, which for their Cloſeneſs, Hardneſs, free Admiſſion, and Emiſſion of Light, we call Diamonds. And as the Preſſure of the Light upon each reſpective Atom, ſo Gravity muſt abate at vaſt Depths, ſo the Preſſure of the ſuperior Parts upon thoſe below, ſufficiently, and in ſome Proportion compenſate it.

Light, in the open Air, where it is continually in Motion, could not fix the Atoms in the Surfaces of a ſolid Body, and oppoſe and vaſtly overcome the counter Preſſure upon the inner Surfaces of each of thoſe Atoms by the Columns of Light from the oppoſite or other Sides, eſpecially on the under Side, where there is leaſt Reſiſtance, and ſo moſt Tendency that Way, or on the foremoſt Side in ſlow Motion. As the Columns of Light fix the Atoms within, where the Lines of Light in the Pores from other Directions fix each Line of Light, much leſs ſo well as the Grains of the Spirit which preſs much more upon a Surface than Light does, and which over-reach the Pores, and each takes hold of ſeveral Atoms at once.

Where the Spirit can enter the Pores of any Body, which is termed a Solid, 'tis ſo far from acting the Part of Light which keeps the Parts together, that it is expanded by the Light which is preſs'd in, and attempts to diſſolve the Parts of the Solid. Where Water can enter, Light does the ſame with it, fibrous Bodies excepted.

As the Grains of Spirit, in Proportion to their Sizes, enable the Light to expand with them, thoſe Bodies whoſe Pores are in proportion leſs and leſs, even down to thoſe of a Diamond, and ſo admit leſs and leſs Grains, even down to an Atom, are in proportion the ſtronglieſt compreſs'd to one another, and adhere the ſtronglieſt; though perhaps the Size or Figure of each Species of Atoms may vary the Proportion in ſome ſmall Degrees.

I ſhall for the preſent defer ſhewing theſe Aſſertions concerning theſe Agents in various Manners, and ſo in various Lights by their Effects, in various Poſitions, and upon various Subjects, by Experiments which have been made, and others which might be made, and the infinite Number of Deductions which may be fairly made from theſe mentioned.

As the Machine which rules this Syſtem may be termed a Fire-Engine or Machine; and as an Acquaintance of mine firſt put in Practice an Engine, to which he properly gave that Name, concerning which he afterward frequently conſulted me, which engaged me frequently to conſider the Powers concerned in it, and the Manner of their Operation, which has ſince, by varying the Application, been improved by another, and is the only Diſcovery worth Notice, which has been made of late Years, I ſhall take the Liberty to explain the Agents, and the Manner of their Action, as far as concerns what I offer, and produce them in Evidence of the ſame

Agents, and the Manner of their Action in the great Machine.

The Iſſue is very ſhort; Whether what I call Light pervades and acts in the Pores of Fluids and Solids: Whether each Atom carries its Space, when it enters between, and ſo divides and expands the Parts of Spirit, or, &c. makes an additional Dimenſion where at Liberty, and attempts to expand where confined; ſo in Solids to preſs, compreſs, gravitate, &c. Or all theſe Actious are performed by imperceptible Properties.

Though almoſt every one has ſeen one of theſe Engines, I muſt mention a few of the chief Parts; all the Contrivance to repeat the Motions, and avoid Inconveniencies, is of no Uſe here, becauſe a few Strokes determine the Agent and its Power, and the Regulators only ſhew that the Power is infinite, if thc Veſſels would hold. There is no Occaſion to deſcribe Dimenſions, Diameters, or Proportions. If the Diameter of the Piſton be but proportioned to the Steam, the Light iſſuing from the Fire can raiſe out of the Water in any ſhort Time, that anſwers this End.

It has a Fire-place walled round, with a Door on one Side, a Chimney from it upwards, a Grate at the Bottom, and Paſſage under to admit the Spirit: A Boiler fixed cloſe within the Wall, and over the Grate and Place where the Coals or Fuel burns; ſo when the Coals are fired, and the Door ſhut, the Compreſſure without drives the Spirit in through the Grate, the Fire melts it into Light, the Light has no Paſſage if the Door be cloſe, but up the Chimney with the Smoke, and ſometimes in Form of Flame, which is reſiſted there with the Preſſure of the Spirit, but through the Pores in the Brick-wall, or the Bottom of the Boiler. Thoſe which paſs the Pores of the Wall, except the Fire be very ſtrong, appear not in Form of Light: But thoſe through the Bottom of the Boiler, if a part of it were Diamond, there it would paſs in ſtreight Rays, and appear light to the Eyes; and where it is Copper, they would in a little Time appear in Form of Light, and continue to do ſo with a gentle Fire: And, I think, if collected through a Glaſs, would fire proper Matter.

The Impulſe is begun and continued upon the Light from the Sun, by the Impulſe of the Spirit ſucceſſively preſs'd into the Fire there, and the Compreſſure upon the Light in the common Condition of the Firmament, is continued from the Expanſion of the whole, produced by that of the Irradiation. This Light is only preſs'd or impell'd from the Fire, with the Force of the Spirit which is preſs'd into the Fire, and ſupported only by itſelf, and by the Compreſſure of the Light through the Pores in the Veſſels from without, inward. And as the Fire augments and melts more Spirit, the Spirit is driven in with greater Velocity, ſo the Light is driven out with the ſame Velocity: But the Force has leſs hold of the looſe Atoms, than it has upon Grains, ſo impels each Atom with leſs Force: But as the Uſe of Light here is not for the Eyes, the Boiler has a cloſe ſpherical Top or Cover, with a Pipe whoſe lower End is fixed into the Cone of the Cover of the Boiler, with a Turn-cock in it, and the upper End of the Pipe, into the lower End or Bottom of a Cylinder, with a Piſton in it, made ſo cloſe, as to keep out the Spirit, but to ſlide or be preſſed from the Top to the Bottom, and from the Bottom to the Top. If the Boiler, Pipe, and Cylinder, were void of Water and Spirit, and only full of Light; if one had Sides and Top of the Boiler, ſo Pipe, Cylinder, and Piſton, which were without Pores, perhaps the Force of the Light in Motion might be near as ſtrong, nay, perhaps ſtronger than the Preſſure of the Spirit on the Piſton: But as the Atoms of the Fluid of Light put into Motion, pervade the Pores of Metal, except they be driven into a Veſſel in ſo great Quantity, that they cannot pervade ſo faſt as they are ſent in, or melted from Spirit by Fire within; they cannot impel much, or give any great Degree of Tendency, but would melt the Sides; or except, when moved with the Velocity of Lightning, or *&c.* ſo as this Light comes through the Pores in the Bottom, it would then paſs thro' the Pores in the Top of the Boiler in the Pipe, Cylinder, and Piſton, and its Force cannot be proved thus alone, except it be armed with ſomething to ſtop the Pores and work with.

As this Diſcovery aroſe from obſerving the Steam ariſing from boiling Water, ſo this Boiler is filled three Parts with Water, and ſupplied. So ſoon as this Light operates, it not only forces into the common Pores of the Water, and pervades them, but extends the Pores, ſo diſtances and expands the Atoms of the Water, but impels the main Subſtance of perhaps Hogſheads of Water upwards; though the Unites of the Names or Light, are dry, and not liable to ſtick to the Unites of ſeveral ſorts of Things; yet by the Figures of the Unites of ſome of thoſe Fluids we call humid, they are enabled to detach, drive, and perhaps adhere to ſome of them.

Though Steam in the firſt Shape of this Engine drove out firſt the Spirit, and after the Water at each Puſh, and does the one, and would do the other in this; I ſhall ſuppoſe this begins with only Atoms of Light in the Top of the Boiler, in the Pipe, and in the Cylinder, if they can detach the Atoms of any Fluid or Matter, whoſe Surfaces are larger than thoſe of its own, and ſo can take more hold of them, act with a joint Force upon them and with them, which cannot pervade Pores, which by their Humidity or Claggineſs will ſtick upon the Surfaces of Bodies, and ſo ſtop part or moſt of the Pores, they are enabled to apply and ſhew their Force.

When the Draught to the Fire is made ſo ſtrong, that the Light which paſſes the Pores in the Bottom and Sides of the Boiler, detach ſo many of the inactive and paſſive Atoms of Water, as form ריח *Odor*, Reek, (ſo Reekon) or Steam, a Fluid compoſed of Light and Vapour, here of Light, and Atoms of Water.) To digreſs; This Mixture is the Agent, in it is the Life, by which all the Operations in Animals and Vegetables are carried on; If not *Job* xiv. 9. *Yet through the ſcent of Water it will bud, and bring forth Boughs like a plant.* Hence this was attributed to Him in *Jehovah*, whom the Light repreſented in a Sacrifice, and called *a Savour* ניחח *of Reſt*, made by Fire, and this ריח is often mentioned in *Canticles.* But to return;) The Light pervading, and proceeding, and driving other Light out, acts, thruſts upon the Surfaces of the Atoms of Water in Steam, drives them forward, and new ones ſucceſſively, till it can, with them, form an Atmoſphere*, and make ſome cleave ſo as to thruſt with them againſt the inſide of the Top of the Boiler, which will ſtop moſt of the Pores, and prevent a great Part of the Expence of Light which pervades alone; as ſoon as the Light comes in, or rather would come in faſter than it does or can go out, it with the Atoms of Water lays the whole Streſs upon the Surface of the boiling Water downwards, upon the inſide of the Top of the Boiler upward, and upon the Sides outward every way; ſo inward upon every Atom, and thoſe Parts which pervade outward, againſt the Preſſure of the Fluid without, inward.

* *An inward Sphere.*

inward. As ſoon as this Force amounts to a certain Degree, that it preſſes more againſt the inſide of the Boiler outward, than the Spirit preſſes againſt it on the outſide inward, it is contrived to turn; ſo open the Cock in the Pipe, and ſo open a Paſſage into the Cylinder, where it meets the underſide of the Piſton at the Bottom of the Cylinder, with the Weight of the Atmoſphere of Spirit upon it, which is equal to the Weight of a Column of Water, whoſe Baſe is of equal Area with the Surface of the Piſton, and its Height thirty odd Feet; and as the Deſigner of the Draught of this Engine ſays, *By its Force againſt the Piſton countervails the Preſſure of the Atmoſphere, and permits it to riſe:* But I ſay forces it to riſe to the Top, and ſuſtains it there till it turn back the Cock, and ſtop the Progreſſion of the Steam, and then till cold Water be injected; and I think if the outward Surface of the Piſton were turned downward, the preſſure upon its Face would be little leſs, ſo would loſe little beſide the Weight of the piſton.

During the Action of the progreſſion of the Steam into the Cylinder, as the piſton riſes, the Light proceeds with the ſame Force from the Fire, detaches and drives on the Atoms of Water, forms an Atmoſphere, and makes ſome Atoms cleave againſt the inſide of the Cylinder, and the Bottom of the piſton, to the Ends aforeſaid; and notwithſtanding the Direction of the Steam through the Pipe, lays a Streſs as well downward, &c. as aforeſaid, as it does upward, where the Piſton gives way.

The Lights acts ſtrongly in the manner of Expanſion in the boiling Water. But by the ſmall Proportion of Water raiſed in Steam, as it appears when collected, the Atoms of Water muſt be each at that Diſtance from other in the Mixture, that the Light can have little Advantage in that manner.

When the Cock is turned back, and the Paſſage through the Pipe from the Boiler is ſtopped, the Steam, with the Compreſſure of the Light which pervades the Pores in the Cylinder, would keep up the Piſton till the Steam ſhould pervade, or Atoms of Water ſhould coagulate and drop.

But when the Piſton is at the Top, it turns the Cock, and lets in a Jet of cold Water through the Side, and into the Cylinder; the Drops each immediately entangle with the Atoms of Water in the

Steam, which they touch, and make thoſe Atoms paſs and ſubſide with them, and, leave the Atoms of Light every where as they paſs, which makes a *Vacuum*, as they term it, near each Drop. The next Atoms of Water to each *Vacuum* are preſſed into that *Vacuum*, and ſo into that Drop or Maſs of Water, ſo more *Vacuum* is formed at each, till the Atoms of Water and Light be ſeparated, all the Atoms of Water collected into a ſmall Quantity of Water at the Bottom of the Cylinder, and all the Light be what they call a *Vacuum*. As ſoon as this Precipitation begins, for the Action is almoſt inſtantaneous, as there is nothing but Light within, and that Light which pervades the Pores in the Bottom and Sides of the Cylinder, and through the Piſton, and is compreſſed inward, which attempts to keep the Light in, or to reſiſt its coming out; the Spirit upon the Surface of the Piſton overcomes the Preſſure of the Light upon the underſide of the Piſton, by the Weight of a Column of Water as aforeſaid, forces down the Piſton, and forces the Light in the Cylinder through the Pores in the Sides and Bottom, and even through the Pores in the Piſton, which when the Water is condenſed it has Liberty to do; and if the

Pores in the Cylinder and Piſton did not let out the Light which remains in it and fills it, after the Atoms of Water in Steam were dropped, the Piſton could not go down.

I have ſufficiently demonſtrated that the Light has a vaſt Force when it is ſeparated from the Spirit, and acts where the Spirit cannot enter, be preſent or act in raiſing the Piſton. But this Caſe of the ſecond Part, where the Spirit ſhews its Force and prevails, does not determine any thing about the Preſſure of the Light. For when the Progreſs of the Light through the Pipe is ſtopped, and the Water in the Steam dropped, the Force of the Light through the Pores in the Piſton downward, is ſet againſt that which pervades the Pores in the Bottom or Sides of the Cylinder upward, and neither of their Forces appear. But the Spirit and the Light upon the Surface of the Piſton expells the Light, and prevails with the Weight aforeſaid.

It is plain there is a much greater Force upon the Air in Motion, than the Preſſure of the Spirit upon the Piſton; becauſe that Preſſure with which the Spirit is ſucceſſively driven into the Fire, performs that Struggle in the Fire, and melts thoſe Grains of Spirit proceeding into Light; and beſides all the Force which goes waſte with that up the Chimney, *&c.* it gives Force to the Parts of Light which paſs the Pores of the Bottom of the Boiler into and thro' the Water, to lift and keep that vaſt quantity of Water in Motion, detach Atoms of that Water, carry them through the Pipe into the Cylinder in Form of Steam with them, to ſtop moſt of the Pores in the Veſſels, and ſucceſſively to enter through the Pores of the Bottom, and ſupply the Expence at the remaining Pores, which the Atoms of Water do not cover and ſtop, to preſs upon the inſides of the Veſſels in every Direction outward, and upon every Atom of itſelf inward, ſo to preſs upon the lower Side of the Piſton, overcome the Preſſure of the Spirit upon the upper Side of the Piſton, force it up to the Top, and would force up any further Weight in Proportion, if the Force of the Drift of the Spirit, and ſo Force of the Fire were continued and heightened as long as the Sides of the Boiler, pipe, and Cylinder could ſuſtain its Force, and without Vent or being cold, would burſt any Veſſel.

So wherever the Spirit is kept off on one Side, and the Light incloſed, and only compreſſed by that which pervades the

Pores from without, inward, the Spirit preſſes with a Preſſure greater than that which removes the Light by the Weight of a Column of Water as aforeſaid. But when many of the Pores can be ſtopped, and the Light iſſue faſter than it pervades the reſt, it is plain it can overcome the Preſſure of the Spirit, *&c.* During theſe Actions the Light is always in the Pores, and on each Side of each Plate of the Parts of the Veſſel, or Faces of the Piſton, and notwithſtanding the Prevalence, ſo Direction and Pervaſion one way the common Preſſure reſts upon the Surface of each Atom the oppoſite way, which preſerves their Adheſion, Gravity, *&c.* And when there is Light, and not Steam within any of the Veſſels, they are formed arch-ways, and ſufficient to ſupport the Difference of the Preſſure of the Spirit: Theſe Motions and Actions do not conſiderably abate the Preſſure of the Light upon every or any Atom of the Sides or Piſton in every Direction, but they retain their Solidity and their Gravity, and the Preſſure of the Light below and above is near equal, except the Difference we call Gravity. And after the Water in the ſteam within the Cylinder is dropped, the Light in the Cylinder preſſed from without, has the ſame Preſſure upon the Piſton upwards, and the Light through the Pores in the Piſton has the ſame Preſſure downward as Light without, and reſiſts and preſſes as much upon the Surface of every Atom in the Piſton facing it or upwards, or in the Cylinder facing it downwards, even while the Piſton is forcing it out thro' the Pores in the Cylinder, and in itſelf, as if it were at Reſt, or not incloſed: Nay when it is put into Motion, and as here has paſſed the Pores of a Shell of Metal, Water, *&c.* it has the ſame Effect upon another Shell, *&c.* That the Force of Light is infinitely great, and ſufficient to perform the Tasks aſſigned, appears here in Miniature. But with what Force the Light within the Cylinder reſiſts the Piſton, or with what Weight it preſſes upon any certain Surface of any or each Species of Atoms, ſo upon each Surface in a Body in Succeſſion, theſe determine not.

Becauſe ſome of thoſe who have not ſeen one of theſe Engines, may not, by what I have ſaid, apprehend the Evidence of the Weight of the Spirit, and the Force of Light, the Beam of this Engine turns upon an Axis, as the Beam of a Pair of Scales; pendent at one End is the Piſton, on the other End the Forcer or Forcers; the Forcers are proportioned, that by the Preſſure of the Spirit upon their Heads, and their Weight, they may force down the Water in the Barrels, and ſo lift up as much Water in the erect Pipe, abating the Height of the Water under the Forcer, as the Weight of the Water, and the Reſiſtance of the Spirit upon the Mouth of the Pipe, ſuppoſing it of equal Diameter, amounts to; ſo to lift Water the contrary Way; and the Diameter of the Surface of the Piſton is proportioned to the Forcers, that when there is what they call a *Vacuum* made in the Cylinder, the Preſſure of the Spirit may puſh down the Piſton, and lift up the Forcers or Water, whereby the Preſſure of the Spirit is proved, and the Steam alone lifts up the Piſton, and overcomes the Preſſure of the Spirit upon its Surface, whereby the Force of the Light is proved. The Caſt of the Scales, the Weight of the Piſton, or the Friction not conſidered. For if the Forcers were taken off, or were not able to over-balance the Water and Preſſure on the Mouth of the Pipe, but ſtood ſtill, the Piſton would be raiſed and overcome the Preſſure of the Spirit. I conſider not the Weight or Difference of the Forcers in the Tendency of the Piſton, which would be if the Cylinder were open below, and that ſpirit as well as light could get to its underſide, becauſe if the Piſton or ſliding Valve be thin and light, that Weight is in Compariſon next to nothing.

Query. If the Weight of the Forcers have any ſhare in lifting up the Piſton in the Cylinder, and how much; it can or need be very little, becauſe their Weight nearly reſts upon the Water which they force or lift perpendicular. And *Query*, if the ſteam could do any more than raiſe the Piſton againſt the Preſſure of the Atmoſphere, and how much.

Whatever figure the Top of the Piſton ſhould be of, concave, convex, piramidical, *&c*. I think the preſſure upon it would be the ſame as it is upon it Plane, and ſo upon the Diameter of any Body, how irregular ſoever the ſurface be.

If inſtead of Water to raiſe ſteam the Boiler were filled with common Air, or with Spirit, I think the Light which [comes thro'] the Bottom, if it could be managed ſo as not to melt the Spirit, would expand the Spirit with that Force, that if, when the Piſton were down, the Cock were opened into the Cylinder, the Light and Spirit would force it up againſt the Preſſure of the ſpirit on the Top, and perhaps overcome a greater force which would ſufficiently ſhew the Force of the light, though it would not anſwer the Uſe of the Engine, becauſe the Spirit could not be condenſed or dropped, as the Atoms of Water are.

Whether the vaſt Quantity of the Water in the Boiler contributes by its Expanſion to the force, or whether if the Bottom were of Iron to endure Fire, and only a Gallon or *&c.* of Water were put in at firſt, ſo a leſs Veſſel and leſs fire would exert this force, and to ſupply a Quart, or *&c.* at every ſtroke, of hot Water would keep the force going, deſerves to be tried.

SEEING and COLOURS.

BY a Ray of light I underſtand a very ſmall ſtreight Pillar of this Fluid, whoſe Corpuſcles are put into Motion chiefly forward; and backward in leſs Degree, ſome outward, and ſome others inward.

Every Pillar of Light is agitated in a ſtreight Line from the Center of the Sun, or, &c. till ſomething interrupt. In Proportion to the Solidity, Thickneſs, &c. of that which interrupts, the Light operates through it, or rebounds and operates in another Courſe; or to ſay the Truth, part operates through, and part is rebounded, in Proportion to the ſtreight pores and ſolids, and to the ſeveral Inclinations of the ſurface it ſtrikes upon: That which paſſes or operates through in a ſtreight line, if it ſtrike upon a parallel Plane, is rebounded in the ſame Line; thoſe which paſs not, but are rebounded from the firſt Surface, act in new Lines, till they be interrupted and re-bounded to the Surface, and part paſs in new Lines, and part be re-bounded, and ſo on fainter and fainter; and the Focus's will be found as well of Reflection as Refraction, by Sir *I. N.*'s Rules; I mean their Proportions: But from other Cauſes than thoſe he aſſigns.

I think Reflection rebounds moſt of the Corpuſcles by one Surface. Refraction diverts the Corpuſcles of Light by their ſtriking upon the ſeveral Corpuſcles in the Medium; each at the different Surfaces of the Corpuſcles or Maſſes they hit upon in the Medium. Inflection diverts or turns the Corpuſcles of Light aſide out of their ſtreight Motion into a new Courſe, by the Medium of the Air, or *&c.* Light ſtrikes ſtrongeſt from the moſt ſmooth or poliſhed Surface; becauſe when the Surface is angular, the Rebounds of the fluid are directed in ſeveral Lines at right Angles, to the Plains of the ſeveral ſides of the Angles on the Surface.

All Light from the Sun, a Candle, or, *&c.* moves in a ſphere from the Center, to the inſide of the Circumference, as far as it can, if nothing intervene, and is reflected from every Point of that inſide of the Sphere, or from what intervenes—— And let a Hole in a Window be made never ſo ſmall, there are millions of Reflections ſtrike at that Point. Thoſe in a Line from the Sun (if it be in a Line) ſtrongeſt. Thoſe from near ¼ of the Atmoſphere from the Earth, and from every Body or Space which can be ſeen from the ontſide of that Hole: And if the ſides through which the Hole is made be thin, they croſs or diverge at that Point: So that if all but one Reflection were taken off, which ſtruck ſtreight or obliquely into the Room, you would only have Light in that Point, whether ſtrong or faint, in Proportion to the Reflection. If the Sides of the Hole were long *, thoſe Reflections would be re-reflected into the Room in different Lines. 'Tis the ſame Caſe upon a Lens: 'Tis not the ſame Rays which come in one Line to the Sides; but Rays repulſed by the ſides of the Room of the dark Fluid of the Air, *&c.* which diverge to diverſe Points, and the Rays or Pillars themſelves reflect one another, the ſtronger the weaker, *&c.* which makes a ſtill greater Agitation in the Focus. 'Twould be the ſame Caſe with the Eye, if the Pupil were ſo large, and Convex, as with the Priſm.

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* *Qu.* What I mean by long, if like a Slit? How if through a Gun Barrel?

Reflection of Light is performed (ſuppoſing Space full of the Fluid) by Corpuſcles that go backwards, as others go forwards the very Moment: As by the firſt Impulſe ſome Corpuſcles ſtrike one forward againſt the Object, another reverts, and moves others to ſtrike the Surface from whence the Reflection came, tho' ſomething weaklier: So that the Corpuſcles of a Fluid which reſt againſt the Surface of a Body, when that Fluid is puſhed, will be preceded by thoſe which were behind; and thoſe driven back, will puſh back and make others do the ſame in the Line they move to the oppoſite Body that bounds the Fluid in that Line.

There are ſeveral Things not conſidered. The Direction the Light has upon the Surface, and the Poroſity or Thickneſs of the Body. If the Light fall perpendicular, and all paſs through, you cannot ſee the Surface. If part paſs, and part be reflected, in Proportion to the Quantity which paſſes, and which is reflected, the different Surfaces will appear. If the Body be of divers Thickneſſes, it will appear of different Colours. Plates of Glaſs change Colour by being viewed ſeparate, or one behind another. And coloured Liquors, as Gall placed upon Cryſtal, change Colours by being laid on thinner or thicker, becauſe leſs or more Light is reflected. If the Surface be Convex, it takes in different Lights; and if there be but one Pillar of Light, it falls in different Directions, more paſſes in one part than another, part paſſes off, and is reflected back upon every Side, and repreſents the Lights from the Reflections. 'Tis true, where the Motion of Light is violent, or as we ſay, Fire, all Bodies appear near Red, and in leſs Degree near White. The various Angles in which the different Streams of Light interſect one another, may exhibit different Appearances; this may be tried by making Rays from different Holes croſs one another at divers Angles: So of three Holes to interſect, as the three Sides of a Priſm do. Cover the Side of the Priſm they paſs not, or paſs a Ray through it ſo as to interſect.

Sir *I. N.* thinks the Light makes Vibrations upon the Optick Nerves, &*c.* as Sound does upon the Veſſels of the Ear. The Fluid may paſs along the Nerves to the Brain, if they be empty from Fluids: But 'tis moſt likely that Light acts upon the Steam in them, and puts it into ſome Motion backwards which touches the Brain, for a Touch in any Part is conveyed by crooked Nerves to the Brain.

The Eye is not at all conſidered, as whether the Impreſſion be ſtrong or weak; whether it come in a perpendicular Line; or ſloping, and in what Degrees of Inclination, whether it come from the Center of Light, or from outer Circles, &c.

As he did not underſtand what the Spirit is, or how it acts, and expels or moves Light, ſo he could not conſider or ſtate its Share in theſe Actions: Nay, ſuppoſing this Atmoſphere, as he doth, to be compoſed of elaſtick Parts, he has taken no Notice of them; becauſe if he had ſtated that, Light could not have moved as he pretends it doth.

Conſider the Crown compoſed of round Rays and Balls moving at the Ends, ſo formed by the Spirit from the Reflection of the Side of a Bottle of brown *Madera*, ſhewn to *Lord*——.

Conſider how eaſily this Fluid can paſs the Pores of our Bodies in the ſeveral Degrees of its Motion, and what Effects it may have.

If one were to ſtand in the Place of the Sun and the Orbit, which the Earth deſcribes by its annual Motion were placed full of Suns, their ſides cloſe to one another like Bracelets upon a Thread, and each appeared but $2^{d}\ 30^{m}$, there muſt appear ſpaces between their ſides: So the fallacy doth not proceed from the Diſtance, but from the Perception of Light. Do not Sir *I. N.*'s ſpots of coloured Light appear the ſame? When the Light in its Courſe ſtrikes obliquely upon the ſide of any Body, but more eſpecially upon the ſide of a Bubble or poliſhed Body, by which and the other oppoſite Motions of Light, it forms Deceptions, or repreſents ſuch Appearances, as a direct Light doth not repreſent; upon which they have with great Pains pretended to ſhew the Manner how Colours ariſe.

If a fluid were moved from every Point of a Globe, it could not move as he deſcribes it. 'Tis the ſame as in a Circle upon the ſurface every Way, or in the Center of a fluid.

The different forces of the Reflection of Light, or the Expanſion in the Atmoſphere, may be proved by letting it in thro' a ſmall ſlit at the Bottom of a Room, and meaſuring the Length each ſtrikes upon the Boards, as well in a ſtraight Line, as from the ſecond Reflections.

Query. If Air or Water, as fluids, and having their Corpuſcles in Motion, may not reflect the Light more than Glaſs fixed, whoſe Corpuſcles ſhift not. Sir *I. N.*'s *Opticks*, *p*. 66. *Lib*. 2. and bright Corpuſcles go forward, or are reflected moſt ſtrongly, becauſe in the line of the Sun.

I think the ſtraight Rays from the Object not only ſtrike the Eye through a Lens or Convex Glaſs, but thoſe which come from other Reflections ſideways, and increaſe the force; ſame of a Burning-Glaſs; ſame of the Eye.

Query. If it be not likely that the Corpuſcles of this fluid are of the figure of Lens's.

The Reflection from a Plain is broader and broader, as you remove from it. The angle from a Body to the Eye is a Point, and the legs extended to the outſides of the Body.

We cannot ſee the ſtars in the Day, becauſe the Motion from the Sun puts the Motion from them aſide.

Does not a Reflection from a dark Colour ſtrike the Eye weaklier than a bright one, and appear nearer?

Try this, either the ſideways Reflections upon the longways of the Priſm, or the Difference in Thickneſs of the Priſm, formed the oblong Spectrum, and the different Colours.

Query. What Figure would an oblong Lens repreſent, and what a Lens thicker on one ſide than the other.

If the Difference in the Colours upon the Spectrum proceeded from different Reflections from without, from the Window ſhut upon the Priſm, or from other Parts, and became Partakers of the Colours of the Bodies from whence they were reflected, or fainter by the often repeated Reflections, their laſt Reflection to the Eye would be in near the ſame Degree, and not be ſtrong enough to move the Pillar to repreſent the Colour of any Body in them. The Senſation of colours reaches but a little way from the Object, the Senſation of the Reflection from the Body to a vaſt Diſtance.

If ſeveral Hoops of Braſs, whoſe Sides were placed parallel to the Semidiameters drawn from the center of the Arch of a Priſm, ſo that the Beams of Light ſhould all fall in the ſame Parallels, would not its focus fall where it doth without them.

It is the Rebounds of this ſubtile fluid, agitated from the Object to the Eye, which give the Senſe of ſeeing, and if Sound can be conveyed out of a Glaſs Veſſel void of Air, nay even full of Air, and hermetically ſealed, through whoſe Sides Air cannot paſs, it is the Motion of this ſubtile fluid alſo, which makes it ſtrike our Ears, and gives the Senſe of Hearing.

The Senſe this fluid gives in the Eye, it is likely is either performed by moving the Steam in the Nerve, or after it has paſſed the Cornea upon the Nerve itſelf, whither the Air or other Agents cannot reach.

And I think the Motion I aſcribe to this fluid by Means of the Sun, Fire, *&c.* not only thins or divides the Corpuſcles or Atoms of it, and thereby renders it capable of being moved, and become what we call Light: but the very Motion puſhes the fluid from the Eye, or ſome other Place to the Object, and from the Object to the Eye, and ſtrikes our Senſe; for if the Senſe of Seeing be performed by Reflection, as they imagine, there can be no Seeing without ſome external Agent to put this fluid in Motion, and Darkneſs is only an Abſence of this Motion.

If the Fluid be agitated too violently, the Eyes cannot endure it, if it be reflected too ſtrongly, it ſtrikes too hard, offends the Eyes, and affords not a diſtinct Repreſentation. By the Degrees of the Ferment of Light, and the Strength of the Rebound, we gueſs at the Diſtance of the Object; different Mediums, (which make us think the Sun nearer at Morn or Night, than at Noon when it is neareſt, and has leaſt of the Atmoſphere to paſs, or things nearer in dull Weather, and larger perhaps by a greater Refraction in paſſing more of the groſs Medium, in paſſing Fogs) make the Sun look red, *&c.* Light ſtriking the Eye through a Teleſcope ſtronglier deceives us.

As the Corpuſcles of the Fluid are more or leſs agitated or divided, and the Fluid made thinner or thicker, it repreſents brighter or darker, and in ſome Degree changes, the Colours.

When the Fermentation in this Fluid is high enough to free Corpuſcles enough, to make the Air light enough, the Steam iſſuing from the Eye can either move, or the Eyes can feel them, and cauſe the Senſe of Seeing; and Sparks and Flame are here formed of Corpuſcles of Matter, that are readily expanded and made by

Fire, and can put the circumjacent Fluid into a Ferment, to produce the ſaid Senſation. Shade is an Obſtruction of the Motion of that Fluid, which gives that Senſation by an opake Body, and is darker, as the Reflections of the Light are fewer or weaker. Darkneſs is a total Stop of that Motion. Seeing is performed by the Expanſion of the Fluid, and Diſtances meaſured by the different Lengths, and thereby different Preſſures of the Pillars of Light: When the Fluid is expanded moſt, it preſſes moſt, as by the Sun, Fire, *&c.* that we cannot bear it. Our Eyes are ſooneſt heavied or hurt by looking at Objects at great Diſtance.

I think we can fix our Eyes upon the Earth or a near Object, but not upon the Sky or a diſtant Object, without ſhutting or ſhifting them.

A ſmall Preſſure of Light is pleaſant, and a great one painful, as Preſſures are upon other Parts. Objects, as the Firmament, *&c.* ſeem nearer when the Light or Expanſion is weak, and at a great Diſtance when the Light or Expanſion is ſtrong. Can any one imagine that if two Perſons ſtand but a Mile from one another, and conſtantly ſee one another, that the immediate Corpuſcles of Light, which ſtrike againſt one Perſon, ſtrike the Eyes of the other, and ſo alternately and ſucceſſively, but that the Fluid by a trembling and vibrating Motion, quicker than the Motion of the Eye, rebounds a little, when it touches the one, and ſtrikes back all the interpoſing Parts of the Fluid towards the Eye of the other? For in a Reflection or Rebound of light to the Eye, a Triangle from the Eye has the Plain of the Body from whence the Light was rebounded for Baſe, and as the Light rebounds from a Plain to near half of the Hemiſphere, it will ſtrike the Eye in any Point of that Space within the length of the Rebound, with the Proportion or Size of the Plain; if the Angles at the Baſe be equal, at full Breadth and diſtinctly; if one of them be greater than the other, leſs diſtinctly and ſo in Proportion. And Light reflects to all Points, from whence an Angle can take in any Part of the Plain or Surface for a Baſe, from the Side of a Globe to any Point; and the Corpuſcles which ſtrike our Ears, muſt move in the ſame Manner. When you ſee your Image in a Glaſs, you have two Rebounds from your Body to the Glaſs, and from the Glaſs to your Eye. It cannot otherwiſe happen in the Diviſion made in this Fluid by the Buſtle in Fermentation, but the Maſſes muſt be in great Variety of Size and Figure; and if it were true that all the Corpuſcles pervade the Body they ſtrike upon, except thoſe which rebound and repreſent the Colours; and if it were alſo true that Corpuſcles of different Colours were of different Magnitudes, each Sort might rebound with different Degrees of Motion, and affect the Eye differently; but how will that hold, when the Corpuſcles reflected from a Glaſs, ſuppoſe Blue appear Blue, and thoſe which pervade the Glaſs into a dark Room, appear Blue alſo? But may not thoſe Corpuſcles which have paſſed through Blue Glaſs into a Room, be rendered bright by Fire or Light in the Room?

If the Diamond admit none but the fineſt, the Colour which paſſes through will be bright; if Glaſſes, or Bodies mixed with Corpuſcles of diverſe Figures, admit Corpuſcles of different Magnitudes to paſs them, or alter the Ferment by abating it, or changing its Direction; thoſe Corpuſcles will have different Effects, or repreſent different Colours to the Eye.

If you ſuppoſe there are ten Sorts of Corpuſcles in this Fluid, to repreſent the different Colours, and that a Quantity of this mixed Fluid ſtruck continually upon a ſmall Globe of any one Colour pendent in the great Space, ſo as to be beheld on every Side; is it poſſible to conceive that $\frac{9}{10}$ of this Fluid ſhould reſt in the Globe, and that $\frac{1}{10}$ could rebound and ſtrike the Eye in any or every Point of Space where nothing intervened, or whither the Reflection reached? This is impoſſible upon ſeveral Accounts; for if one Pillar of Light of equal Diameter, reaching from the Sun to it, contain ſuch an infinite Number of Times the Bulk of the Globe, and were ſucceſſively driven forwards, the Globe would ſoon be full, and in the mean Time but $\frac{1}{10}$ would be rebounded: But the Quantity of the Fluid it reflects is an infinite Number of Millions of Times more, than can touch or come near it in the ſame Space of Time, and ſo ſucceſſively or continually. And two other Impoſſibilities attend this Notion, the Sun muſt continually or every Moment ſend out many Millions of Times more Matter than is in it, and that Matter ſo ſent muſt be annihilated to make Room for more to ſucceed it. If the Eye cannot take in all the Parts of a plain or Surface at once, which is broad or of divers Colours, but muſt view them Line by Line, Part by

Part, or Colour by Colour, ſucceſſively or one after another, there muſt be a ſeparate diſtinct Reflection from each Point or Part, or Colour of that Surface to the Eye, and as many Reflections as the Parts the Eye divides the Surface into in the Time one is viewing it; and theſe Reflections are not only at that Point the Eye is at, but at any Point and every Point an Eye can view theſe parts of the Surface at, and not at one Inſtant, but continually and ſucceſſively, as long as the Fluid, in form of Light, is preſent, and the Eye feels the Reflection from each Diviſion by a diſtinct Pillar or Angle of Light included within two Lines as aforeſaid; and if this Surface had a part of each Colour in Being, every one of them will be truly repreſented to all the Points, and to every Point aforeſaid, by or through the ſaid interpoſing Light. I think the Senſe of Seeing is conveyed by the Touch of the End of the Pillar or Triangle of this Fluid upon the Body, which reflects it to the Eye, as the Senſe of Touching or Feeling is conveyed from the Thing touched by a Stick, or which touches a Stick in ones Hand to the Hand; with this Difference, that we can only feel the moſt prominent parts of a Surface with our Hand or a Stick: but the Eye, with this Pillar, can feel the Surface in all or every Part, though never ſo irregular, nay even the very Figures and Contextures of its original Corpuſcles from whence the different Senſations we call Colours proceed.

If the Surface be very ſmooth and denſe, it will repreſent no Idea but the Reflections of other Bodies, and this Touch is the ſame as would be given to the Hand by a Stick bent at ſuch an End but intire; this ſhews that it comes from the Texture of the Surface, becauſe where that is ſmooth, nothing is repreſented.

One cannot ſee an Object in a crooked Line, no more than one can feel a Body by touching a Stick which touches that Body by another Stick in ones Hand; becauſe as the Reflection or Motion of the Fluid is ſtraight forward, what reaches the Eye out of that Line, comes from a ſecond or another Reflection, and repreſents the Body at the End of the laſt Line only. The Reflection of a Body to a Plain which is ſolid or denſe, and poliſhed or ſmooth, will repreſent that Body at the Diſtance *it is* before the plain behind it. The ſmoother and denſer it is, the leſs Alteration it will make in the Reflection, and give leſs Senſation itſelf to the Eye.

If the Surface of the Glaſs be ſtraight, what Point of that Surface ſoever you look upon, the Point of the Surface of the Body which makes the ſame Angle to a Line in the Surface of the Glaſs from that Part of the Glaſs, as a Line from that Point of the Glaſs to your Eye, makes from a Line in a ſolid Surface of the Glaſs, is repreſented to your Eye; and by turning your Eye to the ſeveral Points in the Surface of the Glaſs, you take in the ſeveral Points of the Surfaces of the Bodies which reflect at equal Angles.

Corpuſcles of Fire, or Light alone, lodge in Diamonds, Chryſtal, fine Glaſs, *&c.* and their Pores admit no Air: So if they be thin, they let only Light paſs; if they be thick, they reflect a great Part of the Light which ſtrikes upon them. Corpuſcles of Fire, and no Air, paſs through a burning Glaſs, or are reflected or rebounded from a Mirrour, which is the Cauſe of their being collected into a Point; or if the Glaſs be properly ſhaped, or the Face of the Mirrour denſe, and of a proper Figure. Teleſcopes do the ſame Thing with Light, as Burning-Glaſſes do with Corpuſcles of Fire; they collect the Corpuſcles which paſs to Points or *Focus*'s, which ſtrike the Eye more ſtrongly, as the Corpuſcles of

Fire in the *Focus* ſtrike the Bodies placed there, more forcibly than when they are diſperſed and mixed with Air. A Tube of Glaſs having the Air exhauſted, and hermetically ſealed, can admit nothing but Corpuſcles of the Fluid in form of Fire or Light: I am not certain whether they can paſs in form of Cold; and nothing but the ſame Sort of Corpuſcles can impel or move them. Hence is that flaſhing Light produced, which we ſee by rubbing ſuch a Tube.

If the Thinneſs of this Fluid could be deſcribed, and the ſmall Degree of Motion, which is neceſſary to ſtrike our Eyes with that Senſation we call *Seeing*, the Operation would not ſeem ſo difficult.

One may conceive that the Corpuſcles of Fire, or thoſe of Light, may be ſo ſmall, that they may pervade the Pores of any Body or Fluid; and if thoſe Pores were ſtraight, there would be empty Space, ſo that thoſe Corpuſcles put into Motion, might continue that Motion almoſt infinitely; but it is hard to conceive how they pervade in a ſtraight Line, without ſtriking upon, and being interrupted by the Corpuſcles of Air, unleſs the ſucceeding ſtill drive on thoſe which are interrupted. Solid Bodies interrupt the Corpuſcles of

Fire, and though they pervade, few go in right Lines, but in all Directions; thoſe of Light can pervade only ſome few ſolid Bodies of a little Thickneſs, as Glaſs, Chryſtal, *&c.* If a Pane of Glaſs a Foot ſquare were ſet, that the Light could ſtrike only on one Side, the Rays would come out diſperſedly at the other three Sides, as thoſe of Fire come through a ſolid Piece of Metal or Stone; and as there are ſuch an infinite Number, ſome of them it is like get forward, tho' many be diverted.

If as many Leaves as Colours (each Leaf of one Colour) were placed one behind another in the Light, would not all the Beams be ſtopt and reflected, each at the Leaf of its own Colour, and what Colour would that repreſent to the Eye? For either they muſt reſt in the Leaves, or be reflected: That they are reflected is certain, becauſe if a Candle were to ſend them againſt a Wall White, thoſe which are reflected from that, can reflect Red Ones from the next Wall they ſtrike, and ſo on.

Des Cartes makes Light a Pulſion or Motion of the ſecond Element. *Vid. Cartes Princip. Par.* 3. *Sect.* 55, *&c.*

When any Body approaches near the Body of an Animal, the Pillar of Æther is interrupted, and the Steam within is let iſſue there; and when any Body is interpoſed at a Diſtance, it ſhortens the Pillar, and leſſens the Force: So perhaps Light, &c. is perceived by the greater or leſſer Force of that without, upon the Steam within.

The Figure of every Body is ſtruck upon the Eye by the Reflection of the Light from that Body; and every Part as far as the Eye can take in within the Compaſs of that Point or End of it which touches the Eye. The Reflection from the Skie, or other Bodies ſtriking with different Strokes on each Side, make the Diſtinction.

Shutting the Eye-Lids, ſtops the Operation of the Æther from the preſent Object, and ſtills them: So that at their Opening, they are freſh to be acted upon by the Æther, from that or any other Object.

Can a Glaſs be placed ſo as to reflect the Image from another Glaſs, and ſo by Sizes of Glaſſes or Diſtance, contract the Figures?

The Eye takes in as much at once, as can ſtrike in at the little Hole directly to the ſenſible Part, and the Verges about that Space tranſverſly; the Verge on the right Side, on the left Side of the ſenſible Part, and ſo contrary on all other Sides.

If Light acts mechanically, *S. I.* ought to have ſhewed that the Parts of it which conſtitute or repreſent this or that Colour, were adequate to, or larger than the Pores of the Matter they were ſtopt by, and that all the other Parts which conſtitute or repreſent other Colours, were leſs, or ſo figured, that they could pervade the Pores of the Body or Fluid, ſo that none of them ſhould ſtay to repreſent any other Colour, which is impoſſible; becauſe the ſmalleſt Pores would ſtop them all, and ſhew a Mixture of them all; ſo Colours muſt ariſe from ſome other Cauſe, and that they do not act by Fits as Bodies do which have Will.

An Unite has no Colour, becauſe it is imperceptible; that muſt ariſe from the Connection of them, or from the Poſition or Inclination in which you view the Surfaces of them adjoining in Fluids, or annexed in Solids.

Colours ariſe from the different Manners in which the Æther is ſtopt, not only on the Surfaces of the Maſſes or Unites which compoſe the Surface of the Body, but on their Surfaces which compoſe the Bodies to conſiderable Depths; in ſome

Bodies quite through; and you look againſt a different Depth, of ſuppoſe a Pane of Glaſs, as you incline more to an acute Angle with the Pane, and ſo it has a different Colour.

Many Colours are formed upon the Surface of the ſame Body or Fluid by the different Reflections of the Sun; as it is going down, it gilds the Sides of the Clouds bright, after it is down yellow, then red, then duſk Colour, then grey, and all in an Hour.

Colours ariſe from Figures, are increaſed or decreaſed by different Degrees of Light: Thoſe Rangements of the Unites or Maſſes are but very few, and the Colours are increaſed in Number by the Means aforeſaid.

Perhaps, the more Light comes through the Object, the Whiter.

When ſeveral Sorts of Liquors are melted, and the Parts divided ſmall, they are tranſparent, when in Maſſes opake; ſo the Water under the Line is divided ſmaller and clearer than here.

What doth Light imprint upon the Eye? they ſay Figure and Colour. I think only the Figure of the Body or the Surface, and that Colour is but a Name for the Diſpoſition of the Corpuſcles or

Maſſes on the Surfaces, or as deep as the Agent penetrates; and that all Senſe on the Eye proceeds from the Obſtruction of the Agent; and that a Diamond which is compoſed of Corpuſcles, and not of Maſſes, but uniform, repreſents no Ideas at all, more than clear Water, *&c.* And the ſame Matter repreſents what they call different Colours, as the Parts of the Surface are variouſly diſpoſed, or as the Surface is variouſly turned or inclined.

This Fluid, like a Spirit, gives you the Impreſſion of every Body in a ſtraight Line, of the Reſt, Motion, *&c.* at a great Diſtance upon applying your Eye, and gives you notice Sleeping or Waking, of any conſiderable Action, by what we call Noiſe; ſo of Smelling; nay, forms and moves every Thing in your Bodies, ſo that nothing is left to you but the Directive Power.

REFLECTION of LIGHT.

THE fermentive Motion of this Fluid from the Sun, is repulſed or reflected in ſtraight Lines from the Plain it ſtrikes upon to all Places whither a ſtraight Light can be extended from any Part of that Plane, and to Diſtances in Proportion to the Force the Fluid had at the Rebound, and the Degree of Fluidity of the Fluid. In its new Courſe, when it ſtrikes upon a ſolid Body here in a clear hot Day, its Force is ſtrong enough to rebound it to other ſolid Bodies ſeveral Times, and that once put into Motion by the Sun, being interrupted by its Rebound or new Motion, can give a new Direction to the Light already in Motion; nay, can agitate Part of the Fluid which was before in that State we call Darkneſs, and by that Motion render it Light.

The Reflections of the Fluid from the Bounds of its Motion in the vaſt Space, as they come mixt to us, with the Reflections from the ſeveral Globes and Bodies, are weak or next degree to Darkneſs, and repreſent what we call blue Sky, like a dark Body with faint Reflections. The Space being full with this fluid, makes it poſſible for this fluid to be reflected ſeveral Times in ſeveral Directions.

The Corpuſcles moved in that Degree we call Light are not ſtrong enough to pervade the Pores of Solids in ſtraight Lines. Thoſe in that Degree we call Heat pervade in all directions ſtraight or crooked, but thoſe which move in crooked Lines repreſent nothing to the Eye but the Senſe of Heat.

Whether that Brandiſhing of the Light upon the Ground in very hot Weather be only the Rebounds of Corpuſcles of Fire and Light, or Steam riſing out of the Earth before Rain which meets them and cauſes that hurry I am not certain: But I think it is only the Rebounds of the Corpuſcles of Heat with what they detach from the Surface.

Conſider how it is in Reflections of Light, do they as ſmalleſt divided ſtill move on by the ſame Rules however reflected till they unite with others and become of like Gravity and ſo reſt, and thoſe of greater Gravity ſucceſſively puſh back and take their Places according to their Gravity; and when their Motions are croſs one another in Fire, or different Reflections, doth not their Motion divide the Corpuſcles of Bodies?

They divide in the infinite Sphere as they recede from the Center, and mix amongſt the groſſer, till their Force is loſt, and their Number not ſufficient to appear, and then form Maſſes.

The lighteſt Part of the Æther ſeparated at the Surface of each Globe next the Sun, is that which we ſee white at this Diſtance, and is in the Figure of a Cap, with thin Edges and a thick Crown: That Cap appears plainly much larger than the dark Side of the Moon.

When the Puſhes of Light from the Sun go in one Line, they produce but little Heat, when ſeveral Reflections from ſeveral Surfaces meet by acting one upon another, they produce that Buſtle: Hence cool Air and Snow upon the Tops of Mountains.

The Hemiſphere of each Globe next the Sun, whither thoſe of Light iſſue, and where the Maſſes of Æther behind the Globe are hindered from pervading, is filled with Light, and the Action thereof divides thoſe Maſſes it found there. By this all Fluids are kept ſo; all vegetable Matter divided, and united with the Æther, and ſqueezed upwards.

When the Rays from the Sun ſtrike perpendicular againſt the Ground, a Wall, or &c. the Parts of the Æther act in the Surface or in the Pores, and are divided ſmalleſt there, and then thoſe which are at ſome Diſtance and groſſer, preſs in and puſh the ſmaller out, and are divided in Degrees as at the Sun.

If the Fermentation or Motion given by the Sun to the Fluid be reflected or turned back in the ſame Line it came, its Force is almoſt doubled; but otherwiſe if it had gone off in another Line; the ſame where Lines croſs or interſect one another.

Conſider the Angles of Incidence and Reflection of the Pillars of Light which ſtrike and go off from the Surface of the outer Globe, and how they cut and interſect one another, and form that Cap of Light which covers the Side of each Globe next the Sun, and likewiſe how they ſtrike and go off from the Surface of the inner Globe, and the inner Surface of the Shells where they miſs that Globe and paſs thro' the Sphere of Water, or how thoſe which reflected from the inner Surface of the

Shell upon the Surface of the inner Globe, are thence reflected outward through the Shell, and how and which of them affect the Variation and Dipping of the Needle upon the outer Surface: Will a Needle point to a *Vacuum?*

The Direction of the Motion of Light from the Sun, or Moon, is directed outward by the Atmoſphere, and ſo greater in the Even and Morn.

Theſe Motions of the Light and Dark, or ſmall and great Maſſes of the Æther, make the ſudden Alterations at Morning and Evening and the Grey Appearances, and perhaps Winds from Sea and Land to the Iſlands: ſettle all theſe Things.

I am not ſure, but I think more light Particles than thoſe which come in a Line from the Sun to a Globe, will fly thither, becauſe as the heavy ones cannot paſs the Globe, there is a Sort of Space made thinner and ready to receive them, and ſo long as the Thinneſs near the Sun is greater than that near the Globe, the heavieſt will puſh thither. (*Query*, if Nearneſs may not prevail and make the large ones puſh in ſooner to the Cap.) But can there not be a middle Motion formed between two ſuch thin Places on the Surface of the Sun and a Globe, or two

Globes? Perhaps there may when the Thinneſs is near equal, but not between a Globe and the Sun (except as aforeſaid).

It is the reflected or rebounded Corpuſcles which heat us ſo much more when the Sun is near our Zenith, or a Plane at right Lines to the Rays behind us.

The Reflecting of Light from the Side of a Priſm, ſtrikes them into the Air, or Light in Motion in another Direction, whereby you have two or more Actions of the Light ſtriking upon, or further reflected to your Eye at the ſame Time, which is not ſhewing Light, but the Imperfection, if one may ſo call them, which not in Nature, but by our Means, happen between ſuch different Motions, and the Repreſentations they make, or the Ideas they raiſe in the Brain, are ſo contrived as to be gay, amuſing, and agreeable to ſuch as could be content to ſpend their Time about Butterflies. When Light ſtrikes a Priſm, it parts the Light and Maſſes of ſeveral Sizes in ſeveral Lines one from another.

When he does it in a dark Room, it is ſtriking Light into the Darkneſs, when in the Rainbow it is ſtriking Light againſt a Cloud, ſo upon a Bubble.

The Reflection of light upon the inner ſide of a Ring or round Veſſel, forms a Heart.

That they note for Blue or Black beyond the Globes is ſo craſs, that the light does not thin it, and will interrupt any reflected Light in a great Meaſure.

When Window-ſhutters are opened, Light expands the Air, and drives it ſenſibly againſt the Body.

A Ray of Light will form a *Vacuum*, and the Rings about the Point will be of ſeveral Degrees of Groſſneſs, and Form divers Colours.

The Light which preſſes through a Hole moves quickeſt in the Center; and beſides the Reflections of the Sides, moves weaklier near the Rim, and cauſes Ideas of divers Colours.

The Æther is put into Motion in the *Bolonian* Stone, by putting it in the Light of the Sun or open Air when the Sun ſhines, and continues in Motion in the Dark, puts the Æther there into Motion, and ſtrikes our Eyes with a faint Appearance of Fire.

Motion is not eſſential to Matter, nor can Matter move further than the Force which impels it continues, and all Matter is moved either by a viſible or inviſible Agent.

This Fluid becomes a ſtop to the Motion given it by the Sun on every Side at that infinite Diſtance where the Force can move it no further; not at once, as it is ſtopt by a Solid, but by Degrees, till the Motion become imperceptible, as Water doth from that which moves it on every Side in a horizontal Plane, or the Motion of the ſame Fluid from other Planes oppoſe it.

Its Motion from the Sun is alſo ſtopt by ſolid Bodies by the Sides of the Globes next the Sun from coming to us, moſt evidently, when a Globe interferes, and cauſes what we call a total Eclipſe; in leſſer Degree, by denſe Vapours or Clouds in a Line between us and the Sun, or by the great Length of the Atmoſphere, when the Sun is in or near a Line with our Horizon, in Proportion to the Quantity of Steam in that Part of the Atmoſphere. For when the Steam in the Atmoſphere or Clouds is too groſs to be put into Fermentation, they interrupt the Motion in that Line, and ſo hinder the Light and Heat; or when the Steam riſes out of the Earth, and meets the Fluid in Motion, it partly diverts the Courſe, and partly condenſes or clogs the Fluid.

The Motion of the Air which we call Wind, in ſome Meaſure abates the Heat; but not the Light; the Rain in falling hinders both.

Though this Motion from the Sun can ferment this Fluid from that State we call Cold, or the humid Vapours which riſe from the Sea, or out of the Earth, yet it cannot ferment the Corpuſcles of terreſtrial Matter which comes in an Eaſterly or other Wind over a vaſt Continent of Land, which makes them more pernicious to Fermentation, Vegetation, and the Functions of Life than Cold.

The Courſe of this Motion is alſo interrupted or abated here by moſt Solids, except thin Glaſs, by the Walls and Covers of Houſes, by the Covers of Vaults, &c. in Degree, according to the Proportion of their Thickneſs, Solidity, &c. when any ſolid opake Body interpoſes between the Sun and us, the Motion in that Line is abated or interrupted, and we have little Heat, and no Light, but what comes by Reflection in Lines from other Bodies, or from the great Circumference where its Motion terminates.

If a ſolid opake Body interpoſe between the Sun and all Reflections, and incloſe us, that Motion we call Light, which comes in ſtraight Lines, in a Moment ceaſes, for the laſt are moved by the firſt like Links in a Chain, or rather like a Row of Bullets in a Barrel. But the Corpuſcles of that Fluid put into that Motion, we call Heat, as they can pervade the Pores of Matter in any Direction, if the Body interpoſing be not very thick or ſolid, will pervade and act, and if they be totally interrupted, ceaſe not to act ſo ſuddenly as thoſe of Light.

When the Clouds, Rain, *&c.* keep off the Ferment of the Sun, and chill that Part of the Atmoſphere like an Eclipſe, the Reſiſtance being leſſened, it ſuffers the Steam to riſe out of the Earth. The nearer the Sun the Ferment is interrupted, as in an Eclipſe by the Moon, the more its Operations here are weakened, and that Stop for a few Minutes chills every Thing here, more than the Interpoſition of the Earth for a Night.

I think the ſides of the Globe oppoſite to the Sun, receive nothing from it, nor ſend nothing to it; for if a Space be near full of a Fluid, puſhing the Fluid in one Part, muſt move Part of the Fluid to the oppoſite ſide in ſtraight Lines, and it muſt rebound from the Plane it ſtrikes, or at leaſt it will be moved a Diſtance, in Proportion to the Strength applied by the Agent, and the fluidity of the fluid; and if one Corpuſcle or ſmall Part be puſhed forwards it puſhes another backwards, or into the Place of that which moved firſt in any Direction, ſo this violent Agitation can never empty the Space about the Sun, nor leſſen the Quantity of the fluid there; nay, if you allow the Fluid to fill the ſpace, let the Sun move the Corpuſcles there, with never ſo great Force, and throw them to never ſo great Diſtance, the Caſe will be the ſame; for the Force that throws them forward, throws others backward; and whatever Diſtance they move at once, the Sun will always be ſupplied with freſh Fluid.

If the Sun be only a *Focus*, its Motion each Way will be equal, except the Reflection of the Globes alter it: If our Poles were not frozen, they would admit more of this fluid, and perhaps their little Motion, as well as the Want of the direct Motion of this Fluid from the Sun, helps to freeze them.

That Part of this Fluid near the Sun, which is put into a violent ferment, is fire; that which is at a greater Diſtance, and leſs moved, Heat; further Warmth, further Light, and where the Ferment is weakened by Diſtance, or interrupted by Matter interpoſing or intermixt, faint Light; Darkneſs and Cold, where it's clogged, or wholly inactive, Froſt.

And it is likely the Agitation weakens where it is pure, in Proportion to the Diſtance of the Lines from each other, extended from the Center of the Sun, or from its ſurface, in a certain Proportion to the Diſtance and Interruption; and this fluid differently moved, or at reſt, communicates ſeveral of its Qualities, and may be compared to Water or other fluids, boiling, warm, cold, frozen, *&c.*

The Corpuſcles of this fluid are moved by the Sun in right Lines from its center, or rather in Angles between Lines extended from the center on each ſide into the immenſe Space.

Its force is ſtrong enough here to rebound at ſeveral Times; ſo this Fluid will form circles every Way about the Sun, or any other Agent which puts it into Motion, thinneſt or brighteſt, or moſt agitated at its Sides, and ſtill thicker, darker, or leſs agitated, as it proceeds to greater Diſtance.

Though the chief courſe of this Fluid is ſtraight forward from the Sun, yet it has a weak courſe ſideways; for when as we ſay Light paſſes through a Hole into a dark Room, the ſtream grows broader and broader from the Hole; the ſtream in a Line from the Sun bright; the ſides of variegated colours.

If the Sides of the Hole be thin, the Reflections or Motions of the fluid from the ſeveral ſides of the Hemiſphere may make ſome Alterations: But if the ſides of the Hole, or the dark Body through which the Light enters be thick, the Reflections can have little Effect; but the colours in the ſides of the Stream muſt be changed by the ſideways Motion of the Corpuſcles, and the different Degrees of fermentation or Motion, or the different Directions of the corpuſcles muſt form or repreſent different colours.

The Agitation of this Fluid in form of Light, ſo entering into a dark Room, is viſible by the Motion it gives the light Bodies we call Sun-Beams, and by its Rebounds upon the Ground in a hot Summer's Day, and I think may be ſeen in a pure Glaſs Receiver, where the Air is extracted.

Every Idea of Matter ariſes from a Repreſentation of ſome one, or ſeveral of our Senſes, or what by Diviſion or compoſition on has Relation to thoſe which have been repreſented by the Senſes.

The Idea we have of any Parcel of Matter being moved by Agents without, will be imperfect till we know the Agent that moves the firſt parcel of Matter, which contributes towards the moving of the ſeveral Parcels of Matter between, and thoſe Parcels of Matter and the Body moved, and the ſeveral Parcels of Matter removed to make Way or Paſſage for it, and the ſeveral Lines, the ſeveral Parcels moved, deſcribe to take their old or new Places. This only relates to viſible Solids, for the Parts of uniform Fluids eſcape our Ideas, and we have no other Idea of them than of Spirits.

The Idea we have of a Parcel of Matter being moved by Agents without, and Parts contributing to the Motion of the Whole, or Parts, or Part within, will be imperfect till we know the Agent that moves the firſt Parcel of Matter, which contributes towards the moving of the ſeveral Parcels of Matter, between the Body moved, and thoſe Parcels of Matter between, and the Parcels of Matter contributing within, and the ſeveral Parcels of Matter removed to make Way, or, *&c.*

The Sun is the Eye of the World, and alſo the Furnace, by which all Things are prepared.

I think all other fluids are inactive themſelves, and their Motion proceeds from the Motion of this Fluid; and this alſo is inactive till it be put into Motion by the Sun, or, *&c.*

If Matter have no inherent Inclination to Motion or reſt, but as it is directed by the Motion of this Fluid, then the Weight or other Qualities which they attribute to the Globes, except their Degrees of Solidity, have no Exiſtence, and this Fluid may move them as eaſily as ſo many feathers, or as it would move without them.

The Preſſure of this Æther ſeparates Matter, each into its Place of Uſe. Bodies moſt ſolid, or moſt united loweſt; and the ſeveral Degrees to their ſeveral Degrees of Diſtance from each Center; ſo that the heavieſt moves toward the Sun, and the lighteſt outwards.

The Motion of the Parts of Air is more violent, as they come nearer the Sun or fire, and ſo break the Maſſes more in ſome Proportion to the ſtraitning of an Angle, as it comes nearer the Center, the ſame Quantity moving through the ſtraiteſt

eſt Part of the Angle, in the ſame Time as the greateſt Quantity moves through the wideſt Part; much in the ſame Manner as the Water which was preſſed from each ſide, towards an Inlet into the Abyſs, which being conſequently with greater Velocity, if the Water be capable of forming into Maſſes, broke them and thin'd it more (which ſeems to be the Caſe in running Water, which keeps it from being corrupt, and of Water raiſed through Pores of Stone, Chalk, *&c.* in Springs which makes it finer, and perhaps ſomething lighter) and alſo tore the Stone with greater Force; and if it were of the ſame Reſiſtance, tore it deeper next the Inlet.

Nothing larger than Unites or Light could ſucceſſively impel and drive them out from the Sun hither; and if the Unites of the Sun be larger than the Unites of Light, not one of them can depart from it, and nothing larger could drive the Unites or ſmall Maſſes of the Æther into the Pores of Veſſels, Bodies, *&c.* with ſuch Force, but ſuch as themſelves behind.

Either there is Unites in the Æther of different Sizes, or elſe the groſſeſt Maſſes are puſhed moſt: But perhaps this holds only as to itſelf, and that the Unites or ſmall Parts of the Æther preſs as freely through between the Unites in the Maſſes of all other Sorts of Unites, as if they remained looſe in Unites.

Though it has been over-looked thus far, the Proof upon which the whole depends, to wit, The groſſer moving toward the Sun, and the ſmaller receding, admits of ocular Demonſtration.

Proofs may be made upon the Motion of the Æther, by obſerving the ſmall Bodies we call Sun Beams in the Light, they being groſſer than the Maſſes of the Æther.

It ſhould be done in a ſtill Day, and no Fire, Holes, nor Draughts of Wind.

They all move in the Stream of Light towards the Window in a line towards the Sun, and partly downwards, when the Sun is low, and I ſuppoſe, ſtick upon the Glaſs, or get out at ſmall Holes.

If there be any Fire in the Room, ſome go to the Fire, ſome towards the Sun, and ſome more obliquely; one may ſee how they move towards the Fire, with the ſame Light of the Sun.

When the Sun is near the *Zenith*, if there were a Hole in the Top of the Room, they would all go out there.

I ſuppoſe thoſe ſmall Bodies are raiſed off the Floor by the Re-action, try them off a Glaſs

Are not Sun-Beams ſuch Matter as form Clouds, before they are raiſed out of the Atmoſphere, the Earth turns them into the Side of Darkneſs?

If ſuch ſmall Bodies were put into a Glaſs, and let looſe after the Air were extracted, one might ſee how they would fall in a clear light.

Sun Beams fly one's Hand gently mov'd; try other Bodies.

When the Sun ceaſes to ſhine, or the Bodies paſs out of the Ray in a Chamber, they fall down.

The oppoſite Motion of the lighter Parts from the Sun, and the heavier towards it, doth nothing towards any body, towards or from the Sun, their Force being near equal (except Sun-beams) but only the Compreſſure of the whole acts in every Direction, nearly equal by Rules, as aforeſaid.

Light from the Sun, a Candle, *&c.* is carried off in this Manner, and a continual Rotation is made in each Sphere of ſmall going off, and heavier coming to, and the heavy, as it comes to, growing ſmaller, and the ſmall, as it goes off, uniting and growing heavier.

Light is ſucceſſively propagated by ſome Action, which divides the Maſſes or Fluid of Æther at the Sun into ſmall Corpuſcles; 'tis driven, by an Acceſſion of heavier Maſſes, in right Lines from the Sun, by the Preſſure of the Atmoſphere; 'tis Day upon that Part of the Earth it ſtrikes againſt, and Darkneſs on the oppoſite Side.

The Light perhaps does not proceed, or put thoſe in Proceſſion into Motion, ſo great a Diſtance as they talk of at an Eclipſe; but the Earth is moved in a few Moments into another Space, where the Light is in Action, and perhaps the Pillar of Darkneſs may alſo move with the Body, &c.

The Recedence of the Light from the Sun, &c. will be diverted, when it ſtrikes ſloping upon Maſſes of Air, which are groſſer than thoſe proceeding, and that is the Reaſon why they pervade the Pores of Glaſs, &c. which are exceeding ſmall, and adhering cloſe, which they cannot do thro' a Body, which has large Maſſes or Intervals. The Sphere of Light, or rather Cap, next the Sun, turns with the Atmoſphere ſucceſſive to behind the Globe, whence Motion of the Globe.

No Force could make Light reflect if all were not full; if any Thing moved one Way, and another Part did not return, it would move what ſtood in the Way.

If the Action of Fire be ſupported by the Diviſion of Fuel, and that Fuel can re-unite and fall down again, that is perpetual Motion.

The Difference between the Sizes of the Unites of Æther, and thoſe of Water, is ſo great, that wherever the Æther is in Motion, and the Maſſes divided to a common Degree of Smallneſs, they keep the Unites of Water diſunited; but they muſt be much ſmaller divided, or in Unites, when they can pervade between the Unites which compoſe their own Maſſes, ſo as to reduce them to Unites, and in conſiderable Motion; whence they do not preſently re-unite into Maſſes.

In the Morning in Summer, or when a Window is newly opened, the Sun Beams move freelier to it.

The force of Motion is bounded, if there be any Æther which the Sun does not move.

Perhaps the Stars which are fixed, are ſo for returning the Light back, and therewith preventing a Stagnation of the groſſer Æther, and making the larger Maſſes return to the Sun; and perhaps ſeen and unſeen, there may be as many of them as environ the immenſe Circle, and moſt near the Equator or Ecliptick.

FIRE.

THIS fluid ſufficiently agitated by the Sun, by Accident or Art, can divide the Corpuſcles of almoſt any Body, without impelling or puſhing the Body forward, but does not impel or drive any ſolid Body here without the Aſſiſtance of Air or Smoak, Water or ſome groſſer Fluid; can by the different Degrees of Agitation and Quantity of its Corpuſcles in the Pores of Bodies of different Conſiſtences divide the Corpuſcles, and by the Aſſiſtances aforeſaid, being ſufficiently injected into and agitated in the Cavity of any Veſſel, or &c. burſt it; when in that Degree of Agitation we call fire, it divides the Corpuſcles of Bodies, or reduces them to near their firſt conſtituent Parts, and ſome ſink, ſome ſwim, &c. but diminiſhes nothing.

Thus Salts in Maſs are inactive, when divided into ſmall Maſſes, fret the Coats of the Skin or Surfaces; when divided into the ſmalleſt, freed from extraneous Matter and agitated, act like fire, which when greatly agitated enter in at the Pores and begin the firſt Actions by fermenting the fluids, and dividing the Corpuſcles of the Solids, &c. But when a ſufficient Quantity is put into Motion or ferment, if it cannot pervade in a Moment, it burſts or diſſolves the ſtrongeſt or moſt ſolid Body.

The Spirit or Grains of Atoms driven by the Impulſe of the Preſſure againſt the Atoms in the Action of fire, are ſplit and divided by thoſe Atoms, as if they were driven againſt ſo many Spikes or Points ſo ſmall as to enter between their Atoms on every Side of the fire; and when one Grain has loſt ſeveral of its Atoms, ſo that another takes Place of it, it is toſſed back, and many ſuch make the Buſtle we call flame: So none can enter till they by ſeveral Strokes and Repulſes are divided to Atoms, and make an Addition or Supply to the Parts of the fire, nor go off till they are ſucceſſively driven out in Atoms or Light.

The Corpuſcles of this fluid by different Degrees of Agitation, in Proportion to the Degrees of Adheſion, divide the Corpuſcles of all Matter, fluid, or Solid; if they be of different Gravities, ſo that ſome will ſwim in Air, and ſome ſubſide, ſeparate them; if they be of equal Gravity, and too heavy to ſwim in Air, calcine them, or keep them in fuſion during the Agitation.

Muſt not thoſe Points which are driven with a force ſufficient to divide and ſplit the Atoms of a Diamond from each other, be as hard as the Atoms of a Diamond, or that Compreſſure which makes them adhere, be taken off or both? In fire, where the Spirit is melted as it comes in, and the Vibration of Light in the Motion we call fire is ſo quick in every Direction, and tends to no Point, the Preſſure of the Spirit is leſſened or taken off: The Direction of the Puſhes of the Light is ſo varied, that inſtead of preſerving the Adheſion, it partly ſuffers and partly forwards the Diſſolution of the Atoms of moſt ſorts of Bodies, keeps ſome of them fluid, in Motion, *&c.* nay, a ſufficient Degree reduces any to Atoms, and upon removing them out of the fire, the Spirit gives them their uſual Degree of Adheſion.

If the common expulſive force of this fluid be the Cauſe of Adheſion and Gravity, where that force is increaſed in a Part of the fluid, it can by its Aſſiſtants or Inſtruments, Air, &c. throw a Body with force and Velocity equal to the Difference between the common and increaſed force, or burſt Bodies, or ſplit Maſſes of Corpuſcles which the common force keeps together. Fire, in Gun-powder, works with the Corpuſcles of Matter in form of Smoke, and thereby expels Bodies with that incredible force, and the Smoke is ſo groſs that it makes a Percuſſion in the Air.

Fire obſtructed by or expanding Water has a prodigious force, and can with a few Grains of it throw off a great Quantity of melted Metal, with a force perhaps not inferior to Gun-powder. What force it hath with pure dry Air, I am not certain.

A ſmall Quantity of Water poured upon burning fuel, as Coals, or &c. expands and burſts the fuel by the Impulſe of the Corpuſcles of fire, and renders the fuel more open, makes more Surfaces, and thence more fit for the Fire to act in.

If the Pores of Fuel be full of Corpuſcles of Water, the Corpuſcles of Fire muſt expel them, each by detaching and bearing off ſome in their Pervaſion, before they can act in form of Fire.

The Corpuſcles of this fluid in paſſing through a Burning-Glaſs, are not only freed from Air, but put into a fermentation in ſome Meaſure as they are in paſſing through fuel. And however they be agitated in our Atmoſphere, except directly from the Sun, cannot act in that Degree we call fire, but in the Pores of fluid or ſolid Matter, where the intervening Corpuſcles keep off the preſſing fluid which is not agitated enough to act.

When Fire in Action is incloſed within a furnace, or &c. it rarifies, expands, and expels the Air upward, and the force of the Stream of Air into ſuch a *Vacuum*, is increaſed by the Straitneſs of the Entrance, as a Spout out of a Veſſel of Water. The ſtronger and quicker the Air moves in, the more it agitates the Fire. If the Entrance for the Air in, and the Paſſage out be too long and too ſtrait, the fire will rarify to that Degree as to burſt the furnance. If the Air be admitted in too faſt, that is, faſter than the Corpuſcles in Action can inflame or agitate thoſe in the Air, it at once clogs and hinders their Action, and the Velocity of Motion in the Pillar. If the Entrance into the furnace below the Fire be quite ſhut, and the Paſſage upward open, it will act very ſlowly. Where Fire has ſufficient Quantity of proper fuel in Action, and is once arrived to a conſiderable Height, it ſufficiently agitates and prepares the adjoining fluid, and without any help by Art increaſes infinitely.

The fluid agitated by the Sun ſtrongly weakens the force of Fire, becauſe it either expels the Air too much, or is too much divided, and pervades the Pores without dividing the Corpuſcles.

The Action or Motion of Corpuſcles from the Sun, are in Lines nearly towards the Center of this Globe, or a little obliquely; thoſe from fire or fuel, in a Line from the Center of the Globe towards the Sun, unleſs forced aſide by Reſiſtance; and in the ſame Lines in which they move themſelves, they move other Bodies; by this Means one of them oppoſes the other, as the Sun-ſhine fire in fuel.

This fluid fermented by the Sun to a ſufficient Degree, has all the Qualities as Fire acting in fuel, only it is freer from extraneous Matter, and is thereby more ſubtile. It is likely when there is any ſudden *Vacuum* made among the Clouds by Condenſation, or &c. this ſubtile fluid ruſhes in firſt, and by its Motion is agitated to the degree of fire, and fires the reſt of the fluid in the Direction it moves.

When the fluid is fired in that Manner we call Ligthening, either the Air is expelled from one Cloud to another, or the fired fluid by meeting the humid Clouds in its Courſe by entring expands the Humidity, and is thereby expelled from one Cloud to another, and makes that Percuſſion of the fluid which we call Thunder, which reaches our Ears in a ſmall Time after the firſt flaſh.

The Rays or Streams of Light or Fire which reach hither, and have ſuch forcible Effects, make little or no Percuſſion in the Air. As the Weakneſs of the Preſſure, or of the Reſiſtance of the Air and fluids, is the Cauſe of Extenſion and Pain in weak Parts, which frequently precede Storms of Wind and Rain, ſo the ſame Cauſes give Opportunity to the Air and

Fluid in Parts adjoining, which are more preſſed, more full, or larger Maſſes, to puſh that Way where it meets with leaſt Reſiſtance. Even Clouds interpoſing between the Sun and any Part, may abate the Expanſion in that Part, and ſuffer the Rain to fall, or the Wind to blow thither from the Places where the expanded Force is greater.

This Fluid muſt pervade the Earth, raiſe Vapours, &c. The Corpuſcles of this Fluid intermixed with others, ariſing out of the Globe on the Side which is turned from the Sun, wholly or obliquely remain entangled with Corpuſcles of other Fluids or Bodies, and are clogged till that Side be inverted to the Sun, and then they are divided, ſeparated, agitated and thinned, and ſo alternately.

Part of this Fluid may be put into that State which we call Fire, by Friction of Solids, by collecting the Corpuſcles with Glaſſes, &c. and by preſerving that fluid ſo collected and put into Agitation by proper fuel: To make fire act here, there muſt be ſo many Corpuſcles in proper Pores of Matter put into ſuch Motion that the Preſſure of Air, and the reſt of the fluid, ſhall drive them forward, but not ſeparate them.

This Fluid, when by any Means any Part of it is put into Motion amongſt the Pores of proper Bodies, keeps itſelf in Motion. When Corpuſcles of this Fluid are in Motion in the Pores of Fuel in the open Air, the Corpuſcles of the next adjoining below or ſideways, drive in, and drive the others out upwards in immenſe Quantity, and with prodigious Velocity, as may be ſeen by the Shade of the Smoke iſſuing from a Candle burning in the Sunſhine, beſides what is thrown out ſideways; and every Atom of the Smoke is compoſed of the Corpuſcles of the fluid, and of the fuel that goes upwards, and thoſe which go ſideways are inviſible, becauſe they are light. When in a furnace, or any thing which confines them, beſides the new ones, the ſame Corpuſcles which have paſſed the Pores are rebounded by the Sides of the Furnace, or *&c.* and paſs the Fuel through and through, before it go off upwards; in like Manner where there are great Quantities of fuel or fire, though the Fluid can enter, yet if the Smoke or Steam go not off, there will be no Continuation of the ferment, as fire will not burn in *Vacuo*, nor Veſſels ferment much when corked cloſe or hermetically ſealed; and it is very likely it is this new

Admiſſion of the Corpuſcles of fire, which keeps up the fermentation ſo long in fluids. And this Agent muſt agitate Salts in Diſſolution of Metals, (whether if the Glaſs be ſealed I know not) Ebullitions in Mixtures of Salts, and ſome Sorts of fluids, Exploſions in Gunpowder, *&c.*

Whether the Corpuſcles of this fluid act the Part of what we call fire alone, or whether they act with the volatile Salts which fly in them, or with thoſe it melts in the fuel, or with both, is hard to determine.

The Pores of fuel muſt be of that Size, and the Corpuſcles of that figure or Adheſion, that the Corpuſcles of this fluid may, but the Maſſes or thoſe of Air may not enter, and that the Corpuſcles of this fluid may divide them, and ſeparate ſome of them. If there be any of Water, they expand, burſt and drive away the Corpuſcles of fire.

As the fire increaſes in force, it divides and prepares more of the fluid about it, or puts more of it into that State we call fire; and if there be fuel or matter ſufficient to act in, it will extend infinitely.

The force of being near the firſt Action prevails againſt the force of the fluid moved by the Sun, becauſe it is diminiſhed by the Diſtance from the firſt Action.

Fire burns beſt in the Night, cold Weather, or froſt, partly becauſe the adjacent Maſſes of the Air, *&c.* are then moſt united and liable to be driven down, and conſequently to drive the Corpuſcles of the Fire and Smoak divided by Agitation upwards, and partly becauſe the Maſſes of the Fluid are not divided too ſmall before they come to Action: For the Expanſion of the fluid by the Motion of the Sun, whereby the Gravity is as great, and the fluid more divided, partly by its oppoſite Motion, and partly by its rendering the fluid too thin, weakens the fire, and conſequently when and where fire is moſt needed, it acts ſtronglieſt: So this fluid in form of Light or Heat iſſued out from the Sun, weakens the force of fire acting in fuel; in form of Darkneſs, and eſpecially Cold, ſtrengthens it.

There are two Operations of this Fluid which affect fire, the one the Preſſure which carries the Corpuſcles of fire upward, impels new Corpuſcles in, and makes the Motion ſtrong. The other Expanſion which when it ſtrikes upon a ſmall fire directly and ſtrongly from the Sun,

Sun it hinders the Motion upward, and weakens the fire.

When two hard Bodies are ſtruck or rubbed one againſt another with great force and quick motion, they puſh the intermediate Corpuſcles of fire violently through the Pores of the Surfaces, put them into that Action by which they divide the Corpuſcles of Bodies; they being once put into that Motion, others ſucceed them by the Preſſure behind, and if they meet with proper fuel, begin to act and extend in Proportion to the fitneſs and Quantity of the fuel, ſo that the ſame Action, as Shaking, friction, &c. which moves the fluid and touches the Ear, continued, occaſions Heat, Fire, Light, &c. And a Tube with a wide Mouth and a ſmall Aperture applied to the Ear, and the wide Mouth at the other End collects and conveys this fluid to the Ear, and ſtrikes the Part which gives the Senſe of Hearing more ſtrongly.

When a Sphere about the Sun is thinned, it goes off equally every way till Globes interrupt, and the groſſer Maſſes preſs in equally; and where there is a Sphere of thinned Matter by fire near the Earth, it takes the ſame Courſe in all Directions, except downwards, if at Liberty, and groſſer Matter from all Sides puſhes in. But when it is confined on all Sides, preſſed by the groſſer, and included ſo that the light matter makes its Way at one Point, the force of Expanſion, or more truly of the Pulſion on every Side is vented there.

The groſſer Parts of the Air are ſtill preſſed to the Earth, between it and the fire at any Diſtance from the Earth, and thoſe divided into the fire cannot retreat that Way.

In ſmall fires here, the fire acts upon the æther, by being ſheltered in the Interſtices of the fuel from too great a Quantity of Air, which would preſs in upon it, and extinguiſh its motion given, and only divides the Corpuſcles of what we call the fuel by that Operation accidentally: But when in ſufficient motion, it flames out to a proportionable Diſtance, and fire injected into Bodies which that force is not able to divide, continues its Action ſome Time.

The Spark of Fire in a Chip of Metal, acts for a moment in its Pores as above.

Does the ſmall æther pervade through the Pores of the Fuel to ſupply the Action?

Does not the Æther which pervades the Earth, raiſe to the Fire and bring up the Water out of the Surface to the Fire? Or is it any more than the, loweſt and groſſeſt Æther at the Surface being preſſed in, which raiſes the Water to Fire, and in hot Weather?

Where there is no Wind, the loweſt and largeſt Maſſes of Air, and not thoſe from above, are puſhed into the *Vacuums* which the Fire makes, and by that means the Parts of Light and Heat recede, and are diffuſed upon the Surface and made uſeful, while the Maſſes of Smoke, and part of the vegetable Matter which goes off from the flame, and which are much larger than thoſe of Light, and the Maſſes of Air which are not ſplit ſo ſmall as thoſe of Light, ſome by their being divided ſmaller than thoſe in the Air next above the Fire, riſe till they come to Maſſes of the ſame Size, and ſome, by the larger Parts of Air puſhing into the *Vacuums* made behind or below them, are puſhed upwards, and riſe till the force of that Part be ſpent, and then fall.

The groſſeſt Parts of Æther enter on the Side of the Body where the Fire begins, and ſome ſmaller, enter from the oppoſite Sides, I think, in Proportion as the divided Parts recede.

There is a proper certain Quantity of Air ſufficient to make Fuel with Fire work, if leſs it will go out or burn ſlowly, if a proper Quantity it will burn very faſt, if more it will burn ſtill ſlower, and the Motion of the Air coming towards that in Action is, in Decreaſe from the proper Quantity, ſlower, when there is too little, and when there is too much.

When the Air has free Acceſs to the Fire, in a ſmall Quantity of Fuel on every Side, the fire burns ſlowly, and the Spaces between the fuel are ſucceſſively filled with flame or groſs Air: But when the fuel is included in a Place, ſo that a certain Quantity of Air can be admitted, no more than the fire can divide, the Space in which the fuel and fire is contained becomes a thin *Vacuum*, and the Air without is puſhed in with greater Violence: If leſs Air than the fire can divide comes in, the *Vacuum* is ſtill thinner, and the Air puſhes in with greater force, and ſo on.

Raiſing the Parts of Oil or Spirits into Motion is but the loweſt Degree of fire, is but that Degree we call flame, that the Parts hover, and will neither ſtay nor go off.

Will Wood burn in Spirits or Oil, when they are burning? Wick of flax doth not.

Where the Parts of the fuel are fluid, they are more eaſily driven up into the *Vacuum* which the fire forms by receding upwards to form the Appearance we call flame, than when the Parts of the fuel are ſolid, and ſo in Proportion.

Oil in ſmall Quantities preſſed into fire, mixes with the fire, and riſes in flame and forms a fluid of near the ſame Groſſneſs as Air, and the fire ſubſiſts in flame, and the Parts of Oil being perhaps the lighteſt of any fluid except Spirits, it and they are toſſed in Form of flame.

Would not Time in burning the ſame Quantity of Spirits of different Proof be different, and that a Proof of the fineneſs of each?

Perhaps the Pureneſs of Oil may be proved the ſame Way.

Perhaps they may burn faſter or ſlower in different Seaſons, but that may be proved by trying proof Liquors at the ſame Time.

Officers may now do as they pleaſe, there is no certain Evidence, what any is above Proof.

Within the Sphere where the fire acts, the Parts of Æther on the outſide of a Body are as ſmall as thoſe within.

Will a burning Candle draw thoſe Maſſes of Air down, &c. we call Sun-Beams to it? Is that Rarefraction greater than that of the Sun, where it comes through a Window into a Room?

The Compreſſure of the Air above, makes the Corpuſcles thinned by a fire, Candle, &c. here, diffuſe ſideways as well as upward. Add that thoſe ſmall Bodies which are divided by a Candle move other ſmall Bodies which are amongſt the larger Maſſes to a vaſt Diſtance on every Side.

Perhaps that which in Mines will not let the Candles burn, nor us breathe, is not Air, or there is not ſufficient Quantity of Air, or that Matter enters the Candle, or, &c. and hinders, ſo we perſpire more. Perhaps the Maſſes are too groſs, and cannot enter; or Water in them, and that intangles the Corpuſcles of fire.

Light will not extend from a Candle, in a Grotto, or Vault, or in Mines, &c. where the Æther is formed into groſs Maſſes, and few ſmall ones remain among them, near ſo far as it will in the Night, where there are many ſmall ones that have been divided the Day before, nor ſo much near the Morning.

Where they are all groſs Parts, and no Parts of the Æther ſmall enough to enter the Pores of the fuel, a Candle will not burn; would a Lamp with Oil, or ſome more open fuel?

Cultivate that, that Light will but ſtrike a little Way in Mines, or Places where there is not, or has not been lately a Mixture of Unites.

While the Spirit preſſes equally upon the flame of a Candle, the Atoms of the flame are ſo near together, and ſo ſmall, that they admit not a Grain till it be melted, and iſſued upwards or outwards in Light; when the Spirit is driven in on one Side more than the reſt to a certain Degree, it diſſipates the Parts of the flame, and extinguiſhes the fire, except it be reſiſted or rebounded, as the Spirit doth in a ſmall Degree, and a Solid in a greater.

A furnace reverberatory, kept cloſe, and over-heated, would be burſt by the Air, and after it were burſt, the Air would blow away the Sides; and if a Ball were placed in a Tube at one End which could come outward, but not go inward, and when it were very hot, the Air were let in at the oppoſite End, it would drive the Ball; and ſo would the Air let into a heated Barrel at the Touch-hole.

In a reverberatory Furnace, the freſh Air comes in only along the Draught, and is kept off on all other Sides and the Heat reflected, which makes it ſo active there, and the cold Air is kept out of the Æther in the flue, which makes it lighter and riſe with greater Velocity, as the Difference between it and the outward Air is increaſed: Hence Fire burns beſt in cold Weather, Night, &c. and worſt in Sunſhine, where the Æther is thin. But Smoke may be expelled up the Cupulo or flue, by being groſſer than the Air is without.

As the different Sizes of ſmall Bodies are neceſſary to divide the Parts of Solids, ſo the Parts of Æther in a very violent fire, may be too ſmall to divide ſome Solids, which a weaker with larger Maſſes may.

Fire cannot divide a Body into ſmaller Parts, than thoſe whereof itſelf is compounded unleſs by Strokes it make the Body fall aſunder.

Vibration in the fire proceeds from the Corpuſcles of fire paſſing between the Corpuſcles of Metals, &c. or between the

Ends of them, and the Spirit beating their Planes or Ends together again.

Fire burns almoſt as badly in the hot Sun-ſhine, as in *Vacuo*, becauſe the Parts of the Æther are ſo ſmall, they make no great Motion by their Difference, nor no Work for the fire to divide them.

A Chaffing-Diſh filled with burning Coals, and placed between the *Focus* and the Glaſs in ſuch a Manner, that the reflected Rays were obliged to paſs through the Evaporations of thoſe glowing Coals, the Action of the ſaid Glaſs was notably weakened thereby.

When the Recedence of the Æther, from the fire upwards, moves with a force ſufficient to overcome the Difference, which the Preſſure above exceeds that from below, upon the Unites of a fluid, or thoſe in Fluidity above it, they move, boil, riſe, or, &c. in Proportion to that Exceſs.

If there be any Unites of Water, in the fuel, for Example, in a Stick of Wood, and it be kindled at one End, while the fire acts weakly, the Unites of Water are puſhed along the Pores into the fire: But when the Action of the fire is increaſed to a certain Degree, the ſmall Parts retire in the Pores from the fire ſo ſtrongly, that they drive the Unites of Water the oppoſite Way. I have ſeen it drive horizontally; will it drive upward and downward? I think only horizontally, or upward, and not downward. But that the groſs Maſſes of Æther raiſe the Parts of the Water into the fire, and the ſmall Parts of Æther force them upward, or to recede horizontally.

Water being of greater Gravity than Fire, the Water being thrown upon the Fire, preſſes into its Place, and puſhes out the fire upwards and ſideways; perhaps the Maſſes muſt not be too far unequal, and that too groſs Maſſes of Air will not aſſiſt Fire, when they will not enter the Pores; and Water being mixed with fire, and raiſed into Vapour lighter than the Air, the Air puſhes in, and drives up the Vapour: So Æther preſſed into the Fire without Air, will not make it burn or blow up with any force, 'till a Smoke ariſe.

The Parts of any Thing which are groſſer than the Parts of flame, and will not be divided in it, extinguiſh it.

The Vapours muſt aſcend from the Earth, becauſe the Fire recedes that Way, if not obſtructed by Clouds. Then ſomething muſt go down, when the *Aurora Borealis* riſeth upwards.

Where, in a Blaſt, the Force is from a Center outward, as in fire or exploſion, it drives the ſolideſt and groſſeſt Part foremoſt, as a Bubble of Phlegm is formed in the fire; where the force is inward towards a Center, it drives the groſſeſt or ſolideſt Parts foremoſt towards that Center; ſo the force outward drives the groſſeſt, and the force inward doth the ſame, which forms a Bubble of Phlegm in the Fire, the Cruſt of the Earth, *&c.*

In Fire-Damps, if there be any Atoms of Sulphur, or, *&c.* heavier, or but as heavy as thoſe of Air they immediately fly to the Candle or fire, and take fire, and as they increaſe the fire more, fly in by the ſame Law, till it in Atoms be reduced to ſmaller Parts than thoſe without, and then they fly in from all the Caverns, and blow the fire, *&c.* out at the Mouth of the the Pit.

The Corpuſcles of fire and the Æther, cannot remove or blow up Solids, even where it is environed, till it has an Atmoſphere of Air or Smoke to ſtop the Pores; hence Lightning that has no Smoke, pervades more, and blows leſs than Gunpowder.

The Sparks of fire in Charcoal fly by *Vacuums* being made behind, and groſſer

Parts of Air puſhing in, and puſhing them out.

Flores Sulphuris, in fine Powder, thrown up in the Air at a little Diſtance from the Fire in the Draught, will go to the fire and appear there, and the Smell of it, when ſmall divided in the fire, will recede to the Place it was thrown up in.

The Salts in the Sulphureous Bodies, Marchaſites, *&c.* divide the Oil by the Help of the Air, and riſe, and ſmell, and ſwim in the Air.

The Stays which melt in *Volcanoes* will ſtop the Water from aſcending through the Cracks, and the Air muſt come ſideways, which makes it burn; when Water gets in, perhaps that makes it fly.

The heavieſt melted Metals or Fluids preſs out fire with greateſt force, and burn moſt.

Whether the Corpuſcles of the Æther or of fire be attracted or kept in Bodies that are hot? I think thoſe that attract moſt, keep hot longeſt, and the Æther pervades ſloweſt, and is longeſt in removing them, or the Action of Heat is continued longeſt by the Straitneſs of their Pores. Where the Pores of a Body or Fluid are very ſmall, and ſmall Maſſes of the Æther are put into Action in them, and thoſe Pores will not admit any groſſer or very little groſſer to puſh them out, they are kept long in Action by ſucceeding ſmall Ones, or long kept hot.

There is alſo ſome ſuch Diſpoſition to be attracted in Fluid melted, as in Iron, which forms it into Globes or Spheres, or ſome figures which let Light pervade them; but they cannot be ſeen for that Reaſon.

I could anſwer a great many wiſe Queries, if I am right, as red hot Iron is Iron, and the fire in it is fire; but this is enough.

FINIS.

HINTS upon philoſophical SUBJECTS.

Tending to illuſtrate and confirm

MOSES's PRINCIPIA.

NOT PUBLISHED BEFORE.

WHEN we begin to treat of Matter, its Attributes and Accidents; and Attempt to convey new Ideas thereof to others (we ought) every one will ſay to give an Account how we came by thoſe Ideas: Whether by Revelation, Relation, Senſation, or Deduction. If by *Revelation*, we ought to ſhew how the Text or Texts are applicable to other than the received Notions; and that the Things or Actions accord better with that Interpretation than with former Ones.

If by *Relation* of Books, we muſt refer or quote; If of Men, we muſt relate their Relations; if the Relations are doubtful, that we or others may reaſon upon their Probability or Improbability. If they are doubtfully expreſt, that we or others may reaſon upon their Meaning: And that we ſhould ſet forth the Authors Opportunity of knowing, Abilities or Means to know with Intereſtedneſs, Diſintereſtedneſs and Capacity of relating what they ſaw or knew.

When by *Senſation*, we ought to ſet forth the Manner how, with all the Circumſtances, eſpecially ſuch as are new or not known to, or obſerv'd by others, or thoſe which have convey'd other different Ideas, to others, in the cleareſt Manner we poſſibly can.

If by *Deduction*, we ought to make others ſure, that the facts we produce in Evidence are true; that the Compariſons we uſe are between Things of the ſame Sort in all conſiderable Reſpects.

That they are Things which have certainly exiſted, or do certainly exiſt, or

Accidents which have certainly happened when thoſe and other Things were in the ſame State, as they were when the Thing exiſted, or the Accident (they are compared with) happened, and not between Suppoſitions, or imaginary Things and Accidents, and real Things, and Accidents which have happen'd; and ſome will ſay, they ought not to be made between a limited and infinite Space; nor between Matter limited, and Matter infinitely great, or infinitely ſmall, nor between Duration, Motion, Reſt, or *&c.* limited, and infinitely Great, Long, Short, or, *&c.* becauſe our Senſes and Faculties are either limited, or at leaſt not capable of extending themſelves, or being extended by us, to frame either real or comparative Ideas of Infinites either way; (if Infinites had any relation to Matter) but chiefly becauſe ſuch Infinites have none, at leaſt, they think they may without offence ſay, ſo far as concerns our enquiries, or our ſelves; and becauſe Ideas of Matter cannot be abſtracted from Matter.

But tho' they pretend to lay down Rules how clear ſuch important things ſhou'd be made, yet in things of ſo abſtruſe a Nature, if I can by ſome Glimmerings of Light make it appear that we have been a long time in a State of Darkneſs, and thereby be able to Point out the Footſteps of real Nature, it will be as much as ever was done at firſt ſtep by human Means in any new Science, or in any old one which had been totally loſt. And if the leaſt Glimpſe of the Beauties of Nature be once ſhewn, notwithſtanding all Prejudices of thoſe who have made or followed other Schemes, thoſe who have not, will admire and follow her.

The Ambition of Men leads them to be Inventors of Syſtems of Nature; and the Heathens who had no Revelation, except by Tradition, were to be excuſed. But of all who have writ ſince Revelation has been diſperſed, I find not one who is willing to own he has had any Account of theſe Laws from *Moſes*, but it paſſes for current that *Moſes* ſpoke not as a Philoſopher but adapted his Speech to Vulgar capacities, and for that Reaſon his writings are only to be regarded by ſuch. I ſhall never aſpire higher than to be a Diſciple of *Moſes*, nor deſire to make a greater Progreſs in the Knowledge of Nature than to underſtand his Writings.

Let us compare what *Moſes* ſays with what we have by Relation from the Pens or Mouths of uninſpired Men. The Antients almoſt univerſally aſcribed every Action to the Sun or Fire, Heat, Æther, &c. as his Iſſue, and decree'd and paid him Adoration, either as Supream or Viceroy.

Of the moderns who have aſpired to be accounted Wiſe, ſome would make all matter Eternal, and as far as I can judge, infinitely extended; and each part infinitely diviſible, and infinitely extendible, and ſuppoſe each part able to move itſelf, or go by itſelf, or at leaſt by innate Powers, each to move other; and if that be once allowed, the next ſet of Philoſophers will teach it to talk, and the next to Reaſon.

Others allow that God created Matter, but make ſomething, or nothing, which they call Space, Eternal; ſome make the Sun run round about us. Some make it keep near one Place. All allow it gives us Light and Heat. Some have ſuppoſed that all Space is full of ſeveral orders of Corpuſcles of Matter, ſome large and dull, ſome ſubtile and active, of which ſome keep their Figures, and ſome by wearing off their Corners have taken other Figures, and formed out of their Fragments a new ſmall and moſt active Order, which run this way and that way, backwards and forwards, without impulſe Laws or Rules, (or, at leaſt with ſuch as they cannot tell how to aſſign them) which form'd the Globes, run round about, in and out of all Bodies and Fluids, which turn the Sun round about its own Axis, and all this Syſtem with it.

Some will have all Matter convertible out of any Species of Bodies, into any other Species. Some will have Corpuſcles eſſentially different for different kinds of Bodies or Fluids. Some will have an innate or annexed Principle with Power excluſive of Means, in each Corpuſcle of Matter, to act thro' all Space, or all other Matter. And a very covetous Principle it is, for each to ſtrive to draw and engroſs no leſs than all Matter to itſelf. But after as many Corpuſcles had pull'd each other together, as came within their Powers, and form'd Globes, they muſt ſtand ſtill; then to give them Motion, they muſt be projected. But becauſe they ſay, Fluids reſiſt Bodies moving in them, they are forced to make the immenſe Firmament a Void or immaterial eternal Space, that you may believe the Globes had their Motion by Projection, and their Aſſertion, that a Body being once projected in ſuch a Space, in any Direction, with any Degree of Velocity, will move eternally in the ſame Direction, and with the ſame Degree of Velocity, or till ſomething interrupted or diverted it. Then all the Globes wou'd begin to move in ſtraight Lines: But as that wou'd not do, and as the Power of that covetous Principle muſt be multiplied in Proportion to the Quantity of Matter pulled together in each reſpective Maſs or Globe, and diminiſh'd in ſome Proportion to their Diſtances, ſo every one pulling every way, and with reſpect to each other, one pulling one way, and another another way, they all pull one another out of the ſtraight Courſes, in which they ſtarted into crooked ways. And each Globe pulls all the Maſſes which belong to, or are near to it, toward its Center. And each Corpuſcle in each Maſs or compounded Solid pulls each other to keep them together; and after Parts of the Surfaces of ſome Sorts are pulled aſunder, and the Body bent, they pull back again with great Force and Speed, out of a Principle of being unwilling to part with any thing they have got. In Contempt of the Laws aſſign'd to Proportion theſe Powers of ſmall Maſſes, one Sort pulls only at one or ſome few other Sorts. And ſome others pull Bits of Straws, *&c.* from the Surface of this great Globe.

The Corpuſcles which conſtitute Fluids, are in general of a generous Temper, and not guided by thoſe ſelf-intereſted Principles, but are free to part from each other, or thoſe of any other Body. So becauſe they will not be govern'd, and becauſe they ſuppoſe ſuch Fluids wou'd interrupt their projected Motions of the Globes, they have diſcharged moſt of them, left only a few about this Globe, and diſpute whether they ſhall leave the reſt of the Globes any. And tho' they tell us, that Bodies projected in this Atmoſphere (which they have not preſum'd-yet to diſcharge, becauſe we have ſome of our Senſes left) are reſiſted by it in Proportion to their outer Surfaces; yet we ſee a ſolid Ball will move further, and with greater Force, with an Impulſe given in that Fluid, even againſt their Power of Gravity, than a hollow Shell of the ſame Sort of Matter, and of the ſame outward Dimenſion with the ſame Degree of Impulſe will. I think they ſay, becauſe the ſolid Ball is more averſe to be moved. Some of theſe Fluids ſuffer themſelves to be pull'd by that centripetal Power. Some of them being averſe to obey that, they allow them a centrifugal Power. However, that Sort near this Globe, are ſoon tired of going from it, keep within its Atmoſphere, or come home again. Above all, they make one Sort of theſe Corpuſcles, each of which is either a Solid or nothing, as flexible and elaſtick as a Watch-ſpring, liable to be wound up by Preſſure into one ſixtieth Part of the Space it poſſeſſes; when it gets a little eaſe, and runs out, by which it does Abundance of out-of-way Jobbs for them which are contrary to all their Laws. The Sun, which they ſay, pulls many thouſand Times ſtronglier than any of his Neighbours, has worſe Luck than any of them; for infinite Numbers of his Parts, which he at firſt pulled in by that Power, fly off from him continually of their own accord, thro' their ſuppoſed infinite Space, and are never more heard of. So if he had not had a good Stock, he had been broke before now. I think they allow for all his fine Shew, he grows poorer and poorer. But to ſave his Credit, as much as they can, they make it a Doubt whether Light be material, and ſo whether he ſpends any Thing, but only glitters and makes a fine Shew.

Tho' theſe Gentlemen are ſo clear ſighted, that they can perceive empty Space, and the Virtues and Powers in Matter, which they by their own Fancies have made; yet they cannot, I ſhou'd ſay, will not perceive, that Quantity, which approacheth neareſt infinite, of ſolid Parts of Matter, which God created and employ'd as his chief Agents, when its Maſſes are too ſmall for their Purpoſes.

In ſhort, they have treated Matter ſo, that others have taken their Arguments, and their Mathematicks, to prove, that there need not be an Egg-ſhell full of ſolid Matter in the World. Others, to prove (I think) that all Matter has ſome Sort of a plaſtick Spirit in it, and that there are no other Spirits. And they have made ſo many Myſteries in Matter, that they have left none for Religion.

Moſt well-meaning People, who have read, or heard what Diſputes there have been about theſe Motions, without determining them, conclude, that theſe Actions are too great to be perform'd by Properties in Matter or material Means, and therefore think they do beſt to attribute the Performance of them to the infinite Power and Government of God; and never conſider for what End God revealed the Creation and Formation and Laws of Matter; nor what St. *Paul* ſays, *Rom.* i. 20. *For the inviſible Things of him, from the Creation of the World, are clearly ſeen, being*

being underſtood by the things that are made even his eternal Power and Godhead. Nor that it is their Duty next after the Belief of God, to believe and underſtand what he hath revealed about them; nor how much the Belief of God is confirm'd by being able to ſhew that the Revelation of his Works is true, and that the Tasks he aſſign'd them are perform'd, whereby they have let an ambitious Atheiſt gain as much Reputation, and pervert as many People by forging a plauſible Story that contradicts *Moſes*'s Revelation, as the Heathen who firſt made Obſervations of the Motions of the Planets did by foretelling an *Eclipſe, to thoſe who had never obſerv'd the meaſures of thoſe Motions.†

Upon a Suppoſition that there are no Parts in the Firmament; or at leaſt in that Part of it they call the Atmoſphere, ſmall enough to pervade the Sides of a Veſſel of Glaſs, Copper, or *&c.* We have been taught to call that which remains in and ſucceeds through the Pores into a Veſſel, out of which the groſs parts or maſſes of the Air have been exhauſted by Engines, expell'd by Fire or *&c.* a Vacuum or empty ſpace. And upon that fallacious Suppoſition they have built many more, ſuch as that, Bodies meet with no reſiſtance there; that Light immaterial, or ſomething between matter and nothing; that the conſtitutient parts of Air are elaſtick, can contract and expand, ſo that the ſame Veſſel, keeping the ſame Dimenſion, can at one time contain many times as much matter as fills it at another time. I think they ſay, they extend themſelves thus only becauſe Nature abhors a Vacuum, and when they have dragged out all that the maſhes of their Net will hold, upon the Suppoſition that they have taken away the matter out of, and the Reſiſtance on the inſide of the Veſſel, (whoſe contents they call a Vacuum) *pretend* that they have ſhew'd the whole Force of compreſſure of the Firmament on the outſide; and that (the preſſure) downward is occaſion'd by Gravity; and that in other Directions by the Elaſticity of the Air.

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* The ignorant at firſt knew theſe, not at laſt.

† Here follow'd ſixteen Pages in the M.S. which are printed in GLORY MECHANICAL from Page 4 to Page 24 So we have omitted them and refer the Reader thither.

The Truth is, there lies a compreſſure upon every ſide of every Unite or Part of matter, Solid or Fluid, inſenſible to living Bodies, and imperceptible upon inanimate Bodies, till the maſſes which compoſe the Fluid on one ſide, be ſmaller than thoſe on the other ſide, and then it is, that living Bodies are ſenſible of the difference, and that that difference is perceptible upon inanimate Bodies, and our Perception of that difference increaſes in ſome Proportion, to the difference in the ſizes of the maſſes which compoſe the Fluid on each ſide. This compreſſure is now perveiv'd to be immenſely great by the difference between the reſiſtance of the Parts, which can pervade the Pores of Veſſels of Copper or Glaſs, Pumps of Lead, Wood, or *&c.* and thoſe Parts in the open Air. How much greater it may be prov'd to be in that manner, the nicety of the Workmanſhip, and the cloſeneſs of the Metal, and perhaps ſome further Inventions, time muſt determine. But the Force of the difference between the Parts of the Air divided by Fire amongſt Gun-powder, and thoſe of the Common Air appears to be infinitely greater, and how great it is in itſelf perhaps is impoſſible to prove.

This difference appears in ſeveral manners, where the Parts of the Firmament or Atmoſphere are made ſmaller or divided by the Sun, Reaction of its Heat, by accidental or natural Fire, by Friction of Solids or, *&c.* As ſoon as that Action ceaſes the preſſure tends thither.

Where the Parts of the Firmament included in a Veſſel are made ſmaller by Fire, or the groſſer are extracted and the ſmaller ones remain, or are preſs'd in and ſucceed, or take the Places of the larger which are driven out; or, where there is a Mixture of groſs Maſſes and ſmall amongſt them without a Veſſel, and ſuch a Mixture within each to be conſider'd as one Fluid, if the Fluid within is in the whole not ſo groſs, the Preſſure tends thither.

Where the Parts of a Fluid, or of a Mixture of ſmall Bodies in Fluids at reſt, or incloſed in the Interſtices of the more porous Solids or twiſted Bodies, are ſmaller than thoſe of the Fluid or Mixture next without, or of thoſe placed next without, which can enter, the Preſſure tends into the Interſtices, and the larger Unites or Parts diſplace the ſmaller.

Where the Parts of a Fluid or a Mixture of ſmall Bodies in the Fluid in Motion in the Interſtices of the more porous Bodies, or lighter Fluids, are ſmaller or ſucceſſively divided ſmaller than thoſe of the Fluid next without, the Preſſure tends into the Interſtices, and the larger Unites or Parts ſtrive to diſplace or move the ſmaller.

When the Parts of a Fluid included in a Veſſel, are larger than the Parts of the Fluid which environs the Veſſel, the ſmaller Parts intermixt among the larger without, are by the Force aforeſaid preſs'd in, and ſtrive to expand the groſſer Parts by entering between them, and attempt to drive them out, and mix and make an Equilibrium. Air acts thus upon Air in its common Degree of Action; and upon groſſer Fluids with a greater Degree of Action. But tho' the Force outward may be great, the Motion produced I think is not ſo great, becauſe it is ſecondary, or owing to the firſt.

Where the larger Parts of the Fluid we call the Firmament are, or a Quantity is obſtructed on one Side, by the Interpoſition of ſome Body, which is very large, or very ſolid, the Difference of the Preſſure tends toward the Body; and is in ſome Proportion to the Dimenſion of the Solid and the Largeneſs of its Unites, and Straitneſs of its Pores: And diminiſhes from the Surfaces of the Solid outward from the Body, and inward towards the Center, in ſome Proportion to the Diſtance from the Surface of the Solid either way. And thoſe Diſtances are greater in Proportion to the Solidity and Diameter of the

Body. This is what they call Gravity to Globes, and Attraction to ſmall Bodies. But by Reaſon of the Poroſity of thoſe Maſſes we call Solids, this Difference is comparatively inconſiderable.

If this Difference of Preſſure of groſſer Parts of a Fluid towards ſmaller Parts be infinitely greater, than the Difference or Force the Fluid tends with towards a Globe (which they call Gravity) and that Solids are puſh'd with greater Force into other Directions, by the Preſſure of the groſſer Parts of the Fluid towards the firſt, than Bodies are puſh'd towards the ſecond, Gravity cannot be the Cauſe of thoſe Puſhes towards the firſt, much leſs (of) lateral Preſſure, which if occaſion'd by Gravity, muſt be weaker than Gravity. Nor can the Notion of the Elaſticity of the Air be the Cauſe of it; becauſe a Body or Bodies bent with the Power of Gravity, cannot exert or relax themſelves with greater Force than that with which they are bent. But if the groſſer Parts are puſh'd towards the ſmaller Parts with greater Force than that called Gravity, that which puſhes may be the Cauſe of that which ſeems to be Gravity, Lateral Preſſure and Elaſticity. Theſe Puſhes given to the larger Maſſes of Air (the Spirit) into the Place where the ſmaller Parts (Light) are contained, and the Motion which ariſeth from thence is what I chiefly intend to explain.*

And this Sort of Motion does not need any other Vacuum (than that which is leſs than the ſmalleſt Part of Matter can fill, and can only be talk'd of, and of which we can have no Perception) to move the Parts of a Fluid in; becauſe as the greateſt Maſſes move one way, the greateſt foremoſt, and ſo in Order, the ſmall ones move the oppoſite way, the ſmalleſt foremoſt, and ſo in Order; except where they are reſtrain'd. And the Action is no more than each ſliding or rolling upon or by another, ſo that if the larger go Eaſt, the ſmaller go Weſt. And tho' this produces a Motion of the Parts conſiderable where the Parts of the Fluid are divided very ſmall, or a conſiderable Quantity is made ſo, or ſeparated, yet each Part is ſhifted but a ſmall Diſtance from its Place, furtheſt near the Light, and leſs and leſs at greater Diſtances, and every Part finds it Place of Reſt again in a Moment, or in two or three Vibrations or Rebounds (which when great they call

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* See Definition of *Light* and *Spirit*, GLORY MECHANICAL, p. 33.

Ecchoes) and come to an Equilibrium: Without this, if all be full in that Manner, I ſuppoſe, if one Part moved, all muſt move. If Gravity was to perform it, and all were full here, and an empty Space were allow'd above, the Fluid muſt be preſt down in one part and fly up in another. If Elaſticity were to do it, ſome Parts muſt expand and others contract; and if all the Parts of this Fluid in one Place ſweep'd one away, as thoſe of other Fluids do, and there were not a continual Receſſion, the laſt Blaſt of Wind wou'd overſet all perpendicular Erections. But while the Light recedes as the Spirit proceeds, every Thing is ſupported. And any Operation can be perform'd by moving Part of the Fluid, proportionate to the particular Action or Motion, without diſturbing the reſt, and thereby moving other Bodies which were not intended to be mov'd. And except all be thus full, and all the Parts of the Firmament be mov'd in this Order, we cou'd have no Benefit of any of our Senſes except Touching. The ſmall Degree of Adheſion of the Parts of Air allows this Motion, and makes it a dry Fluid.

Begging Pardon for breaking Rules, pray let us ſee how Bodies which compoſe this Fluid with ſuch Properties as they call Elaſticity (if there were any ſuch) wou'd move. Suppoſe we have an infinite Number of Unites or Maſſes of Air, all full, bent, cramp'd, and each ſtriving to put out a Leg any way for a little Eaſe, how muſt we get a Vacuum. You muſt perſuade or force ſome of them to draw up their Legs a little cloſer, each from a Point, and leave ſome empty Space. And that Force, at that Point, muſt be ſtronger than the combin'd Force of thoſe contracted. Well, that Force muſt continue, or elſe each ſtretches, and then that Vacuum is gone. Suppoſe Sixty, each draw up one Sixtieth, to make a Vacuum that will hold one: And ſuppoſe the reſt ſhou'd ſtand ſtill till that one popped in there and left his old Place, and ſtretched out all his Legs, and took all the Room: What then, that one wou'd be ſo far from moving or getting by between the reſt, that he wou'd loſe his Spring, not be able to ſtir a Foot, nor draw up a Leg, till his Neighbours preſs them up, and retake the Place they had lent him, and become as they were. And we ſhou'd ſtill want a Name for that Power which made the Sixty draw up, and ſtill are no nearer producing any Force to move Bodies. And if we put ever ſo many various Caſes, the Reſult will be the ſame.

In order to deſcribe Motion, 'tis neceſſary to diſtinguiſh between Space and Place. Space moves with the Body or Fluid which enjoys it. If there be any two fix'd Bodies or Points, Place implies that material Space which at any Time comes to the ſame Angles, from that Baſe, and to the ſame Diſtance to each Point: But Place is frequently taken in the ſame Manner for material Space, from two fix'd Points or Parts of a ſolid Body, which is in continual Motion.

I ſhall put a few Caſes and Mention a few Experiments which have been made to prove the receiv'd Notions, which, with a few Variations, will ſerve for the preſent to explain the Aſſertions I have laid down in general. I do not pretend to Mention, much leſs to aſcertain, the Proportions of the Forces or Volocities. Nor the Proportion between the Impulſe upon the Center, or chief Line of Motion, and which proceed in oblique Lines from each ſide. Nor between this Power in the fulleſt ſtrength it can be ſhew'd, and the other pretended Powers, till proper Inſtruments be made, or at leaſt ſuch as I have deſigned.

If a ſufficient Quantity or extent of the ſmall Parts, which conſtitute that thin Fluid they call a Vacuum, cou'd be ſtill or but gently mov'd, and in ſuch a degree as a Man cou'd live and make Experiments there, tho' we ſhou'd find the compreſſure upon the ſolideſt Sorts of Bodies near as great as in other groſſer Fluids, we ſhou'd find none upon our Bodies, which are ſo porous as to let them pervade; but on the contrary an Extenſion of our Parts and ſenſe of Heat. Nor ſhou'd we find any perceptible reſiſtance to a large Body mov'd in it, in any other Direction than upward. But there has not yet been any Veſſel ſo large exhauſted as to contain a Man, and try to what degree he can act in it. And this cannot be prov'd in an open place here, becauſe, when the Parts of any Fluid in a place open'd, or not incloſed by Solids, are by any accidents ſmaller divided than the Parts of any Fluid next adjoining, as ſoon as that accident ceaſes, thoſe Parts of the Fluid next adjoining, are inſtantly with Velocity and Impetuoſity (in ſome Proportion to the difference of their ſizes) puſh'd into that Place; and the ſmaller Parts which poſſeſſed that Place are puſh'd outward, here moſtly upward, if confin'd in that or thoſe Directions where they meet with leaſt reſiſtance; I ſay, inſtantly, becauſe the firſt Motion inward, and the ſecond outward commence at once, all act at once; each of the larger puſh into the Place of the ſmaller; and each of the ſmaller, puſh thro' the freeſt Paſſages into new Places outward. If the Accident, which divided the Spirit (which was at firſt in that Place) into Light be continued, and the Spirit, which ſucceſſively puſhes into that Place be ſucceſſively divided, the divided or ſmaller Parts will ſucceſſively fly off, and the larger Parts will ſucceſſively take their Places.

When ſuch a Fluid as they call a Vacuum is incloſ'd in a Veſſel, and ſeems to be confin'd, and any Fluid whoſe Parts are groſſer is without, that without compreſſes the Veſſel, and if it Sides yield, the ſmall Parts of the Fluid within, fly out at the Pores of the Veſſel: And if the Sides of the Veſſel be able to withſtand the Compreſſure, and you make a Hole in a Veſſel only ſufficient to admit the Parts of Spirit, they are puſh'd into the Veſſel with great Force; and thoſe which ſeem'd confin'd, or as many of them as can pervade the Pores of the Veſſel fly out each way. Thoſe which cannot paſs the Pores of the Veſſel (if the

Hole be near the Top of the Veſſel) here fly through the Hole. If the Hole be lower down, thoſe parts which cannot pervade, are puſh'd to the Top and collected there: And during the Vacuum any Body (which comparatively is infinitely larger than one of the parts of the Light which conſtitutes ſuch a ſuppos'd Vacuum) let looſe in the upper part of the Veſſel; is puſh'd down by ſuch ſmall Parts of the external Light, which pervade the Pores of the Veſſel from above with greater force, and in greater Quantity than thoſe which pervade from below, and ſo puſh down the Body without any comparative reſiſtance. And ſo, if diverſe ſuch Bodies of different magnitudes, or different degrees of ſolidity, be let go as aforeſaid, they are puſh'd down with equal Velocity, or without any ſenſible difference, becauſe tho' there be viſible difference between the Bodies, there is no Compariſon between the magnitude of any one of the Bodies, and the magnitude of one of the parts of the Light, ſo there is no Compariſon of the difference of the reſiſtance. But if Bodies little larger than the parts of the Light were let fall in it, they wou'd be ſenſibly reſiſted, and not fall ſo faſt, and if one of them were ever ſo little larger then another, they wou'd fall with different Velocities. And if the parts of the Light, or thoſe which wou'd paſs ſucceſſively thro' the Pores of the Veſſel were put into violent Motion by Fire, they wou'd divide and throw up the Parts of groſſer Fluids, ſuch as Water, &c. and while that Motion continues, ſupport them. For while that Agent is dividing the Parts within this thin Fluid in a Veſſel, tho' ſome get in, and ſome get out, the ſame accidents, which happen between a whole ſpace, where the parts are divided ſmaller in the Firmament, than the other parts of the fluid invironing it, happen likewiſe between the Parts of the ſpace in the Veſſel, for inſtantly, as the Parts are ſmaller divided in one part than another, there the other which are groſſer puſh into that part, and ſo from one part to another ſucceſſively, which cauſes that prodigious Motion and buſtle among the parts; and keeps not only the ſmall parts, but thoſe of Water, &c. in Motion. But when the Action ceaſes, or ſuch a Quantity of Groſs, or as they are term'd Cold parts, pervade the Pores of the Veſſel as weakens the Action, or ſtops the Pores of the Veſſel, the Parts of Water or, &c. drop to the bottom.*

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* As in the fire Engine explain'd Glory Mechanical Part I. page 76.

Tho' Air is preſs'd with the force of the Firmament and Atmoſphere, thro' a ſmall Hole into a Vacuum, more than a Pillar or Column of the Firmament of that diameter ſeems to be upon a ſolid, which hath been reputed a Proof that its parts are Elaſtick, 'tis only a Proof that the parts are ſolid, that they are groſſer than thoſe within, that tho' they are fluid, by being groſſer, they are more capable of reſiſtance, and being preſs'd upon by the Firmament than the ſmaller are; and tho' the Light and Spirit without can be preſs'd upon the Light in the Pores of the Veſſel, and thereby preſs'd upon the fluid within the Veſſel, as that ſmall Hole which lets in the Spirit is preſs'd upon more than any part within, where it preſſes with the parts of Light thro' the Pores, the Light iſſues at the Pores, and gives way to the Spirit.

If two Vacuums were made in two Veſſels of Metal whoſe Pores were of different Sizes, and an aperture thro' a Pipe were made between them, the parts in that which had the larger Pores, and admitted the larger Maſſes wou'd puſh into the other, ſo the ſides of the Veſſels are but Sieves to ſort the Maſſes of different Size.

If you bore Holes in the ſide of a vaſt Block of Stone, and put Wedges of dry

Wood in them, and pour Water upon the Wedges, the conſtant preſſure of the Firmament drives the Unites of Water into the Interſtices of the Wood, which were poſſeſſed by thoſe of Air, widens the Interſtices, ſwells the Wedges, and ſplits the Block of Stone regularly as for Millſtones, Columns of Marble, *&c.*

If you pour Water upon a dry Rope, the conſtant Preſſure of the Firmament drives in the Unites of the Water into the Interſtices of the Rope, poſſeſſed by thoſe of Air, drives them out, extends the Rope in Breadth, and thereby ſhortens the Length of the Rope. So they erected the Obeliſk, *&c.*

They antiently, before Gun-powder was invented, heated the Rocks they endeavour'd to break by Fire, which made what they call Vacuums of the Interſtices in the Stone, and then pour'd on Water, or ſome ſubtler Fluid, whoſe Parts were driven in and burſt the Rocks. And indeed thoſe (the Parts or Maſſes) of Spirit will do it in a weaker Degree: The Parts of Vinegar may be ſmaller that thoſe of Water, or ſmaller divided, and ſo no lighter.

Thus the Unites of Mercury are driven into Gold (Lead, *&c.*) Thoſe of Salts in groſs Fluids are driven into the Interſtices of Metal, and an innumerable Series of Actions are perform'd by the ſame Laws.

I think if you fix a Tube to one End of a long Barrel, or oval Veſſel, which ſeems to include ſuch a Vacuum, and fix a Ball fitted to the Tube, ſo that it cannot go in but may go out, and let in the Spirit at the oppoſite End, faſter than the Light can get out at the Pores, the Spirit will drive out the Light and the Ball, purſue it and drive it with a conſiderable Force to a conſiderable Diſtance. Whether in this Caſe the Hole for the Admiſſion of the Spirit may not be made too ſtrait, I am not certain. If the Ball be very porous, or the Parts of the Fluid be ſmall enough to pervade the Ball, the Ball will not move with any great Force, nor far.

When the Spirit preſſes out the Parts of a Vacuum, being confin'd in one Direction, and it moves a Ball, is it poſſible that ſome of thoſe ſmall Parts follow the Ball, and that the Spirit ſtill puſhes after it to overtake them and poſſeſs their Places? Or does the Ball by its Solidity while it is in Motion, impel or divide thoſe Parts of the Fluid which will not pervade its Pores, and ſuffer the Light which can pervade its Pores to paſs backward thro' it, and ſo leave a Sort of Vacuum behind; and the Parts of the Spirit ſtill ſucceſſively purſue that Vacuum? Or is the Spirit, which was ſeparated out of the Firmament, which environ'd the Vacuum and driven in thither, driven after the Ball till it is divided or diſperſed? Or does the Body impell'd preſs and ſqueeze the Fluid before it, make the Light recede and turn behind it, and the Spirit file off to each Side into its Place, and ſo make way for the Body? And doth the Spirit on each Side behind, and ſtreight behind, ſucceſſively puſh out the Light, purſue and impel the Body?

So the Force a bent Body in returning, or Force in Animals, communicates, as they call it, to a projected Body, is nothing more than the Reſt. For if you move a Solid with great Velocity in any Direction, you puſh againſt the Æther in the Line forward, and attempt to leave a Vacuum behind, the Light before during that puſh, recedes to behind; the Spirit before (files off) to each Side; and that behind puſhes after and takes the Solid from their Hand, and drives it on a few Yards, or, &c. in the ſame Manner as aforeſaid.

The Increaſe of the Velocity and Force of Bodies falling towards this Globe (which interrupts the Air moſt in the Line of its Center) and which in falling paſs thro' a Medium, which is groſſer and ſeems to reſiſt more and more as the Body comes nearer the Earth, is owing to ſeveral Cauſes. If the Force of a Body projected in the Air be in Proportion to the Vacuum made behind it, and the Difference between the Sizes of the Maſſes in the Vacuum and thoſe which impel; and that the lighter Matter retires freelieſt upwards, and maketh a greater Vacuum behind a Body dropping down than in any other Direction, and that the largeſt Maſſes puſh the freelieſt downward, and that the Difference between the Sizes of the Maſſes is greateſt neareſt the Earth; thoſe may contribute. And if the Columns of the Air abutting upon the Body to be let fall, were extended in ſtreight Lines to each Side of the Firmament, they wou'd reſiſt equally and keep the Body in its Place. The ſhorter thoſe Columns between the Body and this Globe, and the leſs obtuſe Angles the Columns by the Sides of the Globe make with the Perpendicular the Body is dropt in, the greater will be the Force and Velocity the Body is driven with toward the Globe. And when a Body is projected upwards, beſides the common Degree of Oppoſition, or Difference they call Gravity, which abates as the Body riſes, the Light will not recede in ſuch Quantity behind or below the Body, nor will the Spirit riſe and purſue it in ſuch Quantity, as in other Directions, ſo its Velocity will decreaſe a-pace.

If you by Degrees force in the Spirit into a Veſſel, and thereby force out the Light thro' the Pores of the Veſſel, or fill a Veſſel with Spirit, and afterwards contract the Space in the Veſſel, till the Parts which conſtitute that Fluid within, be in a conſiderable Degree groſſer than the Parts which conſtitute the like Dimenſion of the Fluid without, and fix a Tube to the End of the Veſſel, with a Ball fix'd in it, ſo as to be let looſe at Pleaſure, the Compreſſure of the Spirit without, upon the Light which pervades the Pores, which reſiſted the Force with which you drove the Spirit in, and which puſhes againſt the Spirit within (with Force in Proportion to the Motion it is put into ; and by carrying its Space between the Parts of the Spirit poſſeſſed of the Space in the Veſſel, and which cannot get out) attempts to expand the Veſſel, till the Fluid within be equal to the fluid without. But if the ſides of the Veſſel reſiſt, and the Ball be let looſe, that Spirit is puſh'd out into the thinner fluid without, in the Direction of the Tube, and drives the Ball out with great Velocity and force, and the Air purſues it to a conſiderable diſtance.

Where there are ſo many of thoſe groſs Maſſes of Air, perhaps Parts of Clouds, diſſolved Vapours, or *&c.* driven in one Courſe, towards the place where the Parts are ſmaller, or deſcend, as to form that Motion and Force we call Wind; yet as they are few in Proportion to the ſmall Parts of Air they paſs between, or amongſt, ſo the Recedence of theſe ſmaller Parts, though they form a Reſiſtance, and ſtop the larger Maſſes, till they come in Guſts; yet form ſcarce any perceptible Degree of Motion the oppoſite Way, becauſe their Motion will be leſs, as their Quantity is greater. And thoſe larger Maſſes in Motion are by the greater Reſiſtance above, continually driven down to the Surface of the Earth, which makes the Motion ſtrongeſt there. And though this Motion of Wind drive forward the Smoke and Flame from fire, yet the Wind bringing the larger Maſſes to the fuel, and the ſmaller, or fire receding in the ſame Direction the

Wind comes in, fire burns againſt the Wind, and I think Light recedes moſt, and a burning Body may be ſeen furtheſt againſt the Wind.

If you convey a few drops of Water into a Pan of melted Lead, very hot, ſome Depth below the Surface of the Metal, the Æther put into Action there, preſently divides the Parts of the Water, mixes with them, and forms a thin Fluid, and the Preſſure of the Firmament upon the Surface of the Lead, and by the Æther which is intermixt with and pervades the Lead, forces the Water upward, and it drives part of the Lead in that Direction, where it hath leaſt Reſiſtance, and the Air takes out and purſues and drives it to a great diſtance with great force. And if an open Tube were placed with one end to the place where the parts of the Water are divided, or the Water be placed at the bottom of a Hole bored, and hot metal pour'd in, the metal will be thrown in the direction of the Tube or Hole. By theſe means we ſee a little Water in form of moiſture in the Moulds, or *&c.* blow up whole Foundaries, and in greater quantity would produce a ſurpriſing force, much beyond the like quantity of gun-powder: becauſe I think there is a much greater difference between the Parts of melted Metal, and thoſe of divided Water mixed with thoſe of Light, than between thoſe of the Spirit, and Light, and Smoak.

The ſmall Parts of Æther divided in that Action we call burning, and which ſo divided, and in Action we call fire, and which upon their being divided to a certain Degree of ſmallneſs (in Proportion to the Degree of the ſmallneſs of the Maſſes of the Spirit they are incloſed by) retire or recede, or are puſhed outward by the Spirit through the Pores in the ſides of a Veſſel into Water, and heat or boil it, and thence divide, detach and bear the Unites or ſmall Maſſes of Water into the open Air, if the Veſſel which contains the Water be open, if the Veſſel be cloſed, all but a Pipe into what they call a Vacuum, will detach and drive thoſe parts into it in form of Steam, becauſe they are larger than thoſe Unites, or ſmall Maſſes of Air which were within, and will drive them out thro' the ſides of the Veſſel, which included thoſe ſmall parts which were called the Vacuum. *And the ſteam will during the Action, not only be augmented but expanded, as

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* When there are parts within ſmaller than thoſe which paſs the Pores, thoſe which paſs the Pores inward drive out thoſe which are ſmaller within.

ſoon as its parts compoſe a fluid groſſer than the Air without, in Proportion to the Action and Application of the fire. And if that be ſufficiently great, till it wou'd throw a Ball, as aforeſaid, or till one of the Veſſels burſt. But if the Action of the fire firſt ceaſe or cold Water be outwardly applied, the parts of the Water fall to the bottom of the Veſſel, and the parts of the fire form into Air above.

If a Glaſs Drop or ſhell of any ſolid be fill'd with Water or Spirit, or have the Spirit extracted, and the ſpace within be made what they call a Vacuum, and the ſhell cloſed and put into the fire, and as they call it ſufficiently heated, it will be burſted outward or inward, and the parts of the ſhell fly with force and noiſe.

They have got a Notion that the parts which iſſue from fire, (ſuppoſe from a burning Candle,) are parts of the Candle, and becauſe Light can be diffuſed (while a grain of Candle is dividing and being born off) to a vaſt diſtance, that matter can be infinitely divided and infinitely expanded; tho' a grain of matter, whether it be united or divided, poſſeſſes the ſame ſpace, and the parts of the fuel produce no Light but Darkneſs when divided. But the Truth is, 'tis the parts of the Spirit,

Spirit which paſs to and are divided, while a grain of the Candle is dividing, with the Velocity, with which one may ſee them move, which fly off, mix with, thin, and move amongſt the Dark Æther or Air, and move other ſmall parts which are amongſt the groſſer, to a vaſt diſtance. And one of their own Experiments ſhews that it is not the parts of fluel, but of ſmall Æther, which when mov'd repreſents Light: For when the groſs parts of the Æther are extracted out of a Veſſel of clear Glaſs, and ſmall ones only enter or remain, if in the Dark, (by rubbing the Glaſs with your Hand) You make the ſmall parts without enter and move thoſe within outward thro' the Pores of the Glaſs, they produce quick flaſhes of Light.

If Fire, or the Parts of the Æther ſufficiently divided and put into Motion, be put into the Pores of proper Fuel on the Surface of the Earth, or &c. in the open Air, as it divides the Spirit in the Pores of the Fuel, and makes Numbers of Vacuums, the Spirit without is puſh'd in, and to and fro, and puſhes ſome of the Parts, ſo divided out, and by that Action accidentally divides the Parts of the Fuel. If it be in Darkneſs, divides the Light from the Darkneſs, and by the Continuation of this

Action, admits and divides more of the Groſs, and expels more and more of the divided Æther, in Form of Light, Warmth, Heat, *&c.* And as the Actions increaſe, the Accidents increaſe, till there be a Defect of Fuel, or of Spirit or Air.

But ſince Light, Heat, Warmth, Fire and their Oppoſites, as well as Fluidity and Solidity, are not only Accidents, but comparatively, acceſſive, digreſſive, and temporary Terms, and that a few of the Maſſes of Spirit divided not very ſmall, alone or unmixt; or ſome divided ſmaller and intermix'd with thoſe which are larger; in their Motion or retreat againſt a ſurface, produce Light, while the larger Maſſes even in the ſame place, moving in the contrary Direction upon the oppoſite ſurface of a Body, no thicker than to interrupt Light, produce none, and a few more in Proportion of the divided parts, or of thoſe divided ſmaller, in their retreat againſt a ſurface, produce warmth, while the larger Maſſes even in the ſame place, and moving in the contrary Direction produce none upon the oppoſite ſurface, but rather make it grow cooler, and heat and fire are but the ſame accidents in greater Proportions or degrees, ſo that, as we ſay, the one ſide may burn, while the other ſtarves, it appears plainly, that theſe accidents ariſe from dividing ſome of the Maſſes of the Spirit, and that the Separation, or paſſing in of the larger, and the recedence of the ſmaller, follows from the compreſſure of the whole; and the difference of the impulſe by the different ſizes of their ſurface; and in ſhort, that the dividing of Light from Darkneſs is the Task of the Firmament.

If you put fire to fuel in the Grate of a Reverbatory furnace near the Top of a heap of Coals, tho' the ſtream of Spirit drive the ſmoak and flame into the furnace and up the flue, yet the fire will recede downwards and againſt the ſtream, and enter the Pores of the Coals and divide their parts. And if you raiſe the Action to a great height, and thereby make the Motion of the Spirit to it, and the Motion of the Light in it and up the flue, very violent, and place any Body in the furnace, and in the fire, the parts of the fire will inſinuate themſelves into the Pores of the Body, divide the parts, carry off moſt ſorts, and keep thoſe of other ſorts in Motion, *&c.* and if the Light within be raiſed to a certain degree of thinneſs by dividing the parts, the preſſure without will burſt in the ſides of the furnace; or the Light will by attempting to recede, melt them. But if you give Admiſſion to the Spirit on any ſide of the furnace, but where the fuel is placed, thro' a ſmall Hole, it mixes with the Light, forms a groſſer Æther, and reſiſts the compreſſure without from burſting in the ſides, and the Light within from melting them. If you ſtop the Admiſſion of Spirit to the grate, the fire ceaſes. If you ſtop the Emiſſion thro' the flue, either the furnace muſt burſt or the Action ceaſe.

When Gunpowder is fired thro' a Touch hole in a Barrel, and the Spirit amongſt it divided, it acts in a groſs fluid at firſt, the Maſſes of Spirit ſtriving to enter ſucceſſively at the touch hole ſucceſſively expand, puſh forward the ſmoak and are ſucceſſively divided, and the divided Parts of Powder being groſſer than thoſe of the Spirit are driven foremoſt the oppoſite Way, or in the Line the fire and Air enter'd at. If the Powder be left looſe or naked before, it only makes a ſmall blaſt. If cover'd, and that hole be before part of the Powder, it cauſes a recoil, and the fired Æther, by the puſh of the Air before, which ſtrives to enter into the Vacuum and is kept out by wadding, or ſomething which ſtops the groſs parts, is forced to recede in part thro' the touch hole againſt that entrance of the Air, and thro' the Pores of the Barrel; and if it could continue would, and when repeated, doth melt the Sides of the Touch-hole. When the Action of Fire is ſpent, the Smoak taking its Courſe forward, the Air entering at the Touch-hole drives into the Vacuum, and drives out the Fire, and every Thing placed in its Way, with the Force we perceive by its Effects. If in the very Action you can ſtop the Place the Air enters in at, the Motion ſtops: If not, and there be a Ball, as ſoon as it and the Fire are out of the Barrel, the Fire forms a ſort of a Vacuum at the Muzzle, and the Spirit puſhes in and purſues the Ball in the Direction it was going. If the Barrel in which the Powder and Ball are placed be ſo ſhort that the Bullet be driven out into the open Air by the firſt Action, or Attempt to expand the Parts of the Powder, like that in a groſſer Fluid before the Air be ſufficiently fired or divided in the Barrel, it goes with a ſmall Force. But the further the Spirit is divided by Confinement or Length of the Barrel, the Force is increaſed. The Preſſure and Solidity is ſufficiently ſhewn in that a Line of Spirit little thicker than a Hair, is ſufficient to puſh any body out of its Place: Whether any Hole too ſmall for the Spirit to enter at in ſufficient Quantity, can be made by an Inſtrument, I am not certain.

Where what they call a Vacuum is immediately made in Part of the Atmoſphere, if ſolid Bodies be placed about it, and only an Inlet for the Spirit, that Spirit will puſh in with that Force, as to blow up the Solids, purſue and drive the Parts ſeveral Ways. In blaſting ſolid Rocks where it has no Vent but at the Touch-Hole, its Force is incredible.

But to enter more cloſely into a Diſcovery of the Manner how the Parts of Æther divided ſo ſmall, till they act the Part of Fire, ſucceſſively divide others and fly off. How that Action is ſupported among the Intervals between the Unites or Maſſes of Fuel here (which are hid by the ſolid Unites from any Diſcovery which can be made by our Senſes, or by the Help of Glaſſes) &c. we muſt employ our Reaſon by Compariſons of ſuch Actions of Fire, which we can perceive. Firſt the Unites or Maſſes of the Body or Fluid it acts among, which we call Fuel, muſt be above a certain Size, ſo ſmall, that the Compreſſion of the Air by the Action of the Fire may vibrate them, that, as the Action of Fire riſes or is increaſed, it may open or widen an Interſtice; and that the Compreſſion of the Air, as the Action of the Fire decreaſes, or the Parts of the Fire are divided ſo ſmall, as to have little Reſiſtance, may by the Unites of the Fuel, puſh Part of the Fire into other Interſtices, and Part outward, and ſtraiten the Interſtices. Whether the Diviſion of the Parts of the Fuel on the Outſide, which are burnt off where the Action is ſtrongeſt, be neceſſary to the Support of that Action or no, I am not certain. But I think 'tis only accidental, becauſe they are more preſs'd on one Side than on another here. So the Parts of Fire cannot act among the groſs Unites of Metal, Stone, Water or &c. except ſupported among thoſe of other Fuel adjoining or ſucceſſively infuſed. And the Interſtices of the Fuel muſt be filled with Æther, or ſome other Fluid, whoſe Parts are ſo ſmall, that the Action of the Parts of Fire apply'd can divide or remove them, and poſſeſs their Places, and not with the Unites of Water, or of ſuch groſs Fluids which are too large to be remov'd by the Action of a few Parts of Fire. And thoſe Interſtices in the Fuel muſt be ſo wide, or capable of being made ſo wide, by the Action of the ſmall Quantity of Fire, that when the ſmall Parts of Fire are enter'd into them, thoſe Maſſes of Æther which are without, and not divided, may be preſſed in and force the ſmall ones, ſome forward and ſome outward. So the Parts of Fire cannot be kept long in Action in the Interſtices of metal, *&c.* becauſe their Interſtices will not admit Maſſes of Æther of ſufficient Sizes, and in ſufficient Quantity, to keep the ſmall Parts in Action, but by Degrees, as they ceaſe to act, to drive them out. When Parts of the Spirit made ſmall by Colliſion between hard Bodies, collected out of the Rays of the Sun, from Fuel or *&c.* are put to Fuel thus contrived and mix'd, each Pore or Interſtice whither theſe ſmall Parts are admitted, becomes in ſome Degres what they call a Vacuum, and the Compreſſure of the Spirit without, upon the Surfaces of the Unites of the Fuel, and upon Apertures to the Interſtices, drives the ſmall Parts ſome forward, ſome outward, and the larger Maſſes of Spirit, in being puſh'd into the Interſtices where there are ſmaller Maſſes or Unites, are ſplit or divided by ſtriking upon the ſmall Maſſes or Unites they meet, receding, puſhing, or being puſh'd outward, or paſſing or repaſſing from one Interſtice to another. And the Sides of the Unites or Maſſes which include each little Vacuum, reſiſt the ſmall Parts, and form a reaction from each Side, whereby the Parts of the Spirit, which are incloſed or admitted, are divided ſmaller and ſmaller. As ſoon as the Parts of the Æther in one Vacuum are divided ever ſo little ſmaller than thoſe in the next adjoining, thoſe which are groſſer, are puſhed in, drive ſome of the ſmall Parts further into other Interſtices, and ſome recede, fly out into the Air, form Light, Heat, *&c.* Where there is no Wind, the loweſt and largeſt Maſſes of Air, and not thoſe from above, are puſh'd into the Vacuums which the Fire makes, and by that Means the Parts of Light and Heat recede, and are diffus'd upon the Surface and made uſeful, while the Maſſes of Smoke, and Part of the vegetable Matter which go off from the Flame, and which are much larger than thoſe of Light, and the Maſſes of Air which are not ſplit ſo ſmall as thoſe of Light, by their being divided ſmaller than thoſe in the Air next above the Fire, riſe till they come to Maſſes of the ſame Size. And ſome (by the larger Parts of Air puſhing into the Vacuums made behind or below them) are puſh'd upward, and riſe till the Force of that Puſh be ſpent, and then fall.

So by the infinite Number of theſe Interſtices, and the Variety of Accidents, while ſome are ſupplied by larger Maſſes from without, and ſome ſmall ones recede into the open Air, and others proceed forward, and the whole is compreſſed by the outward Air, as the Parts in one Vacuum are dividing ſmall, the Vacuum extends. When they are divided ſmall, they are preſs'd out, and the Interſtices contracted, or the Unites of the Fuel which form'd its Sides preſſed nearer together: Or as the Parts in one are divided ſmaller than thoſe in another, thoſe of the larger are puſh'd into the Place of the ſmaller, and ſo backward and forward in each Direction, and thereby the outſide Unites or Maſſes of Fuel are ſplit from each other, the large ones drop, and ſome of the ſmall ones are born off. And thoſe ſmall Parts of the Fuel and Æther, which ſucceſſively are driven out, and are not ſmall enough to fly off, are toſſed to and from the Surface of the Body in Fire, in Form of that opake Mixture we call Flame, till they by Degrees are further divided and fly off. Different Degrees of the Qualifications are neceſſary for the different Proportions of Fire to begin to act upon, or continue to act in. The

Velocity, or Slowneſs of the Progreſs of the Fire here, is in Proportion to the Degrees of Fitneſs of the Fuel it acts in; is highten'd by the Contrivance, Diſpoſition or Mixture of the Fuel, and perhaps is aſſiſted in dividing the Parts of the Fuel, or to form Vacuums by the Unites of volatile Salts, which may be puſhed in with greater Force than thoſe of Æther. The ſmall Parts of Æther act the ſame Part in much the ſame Manner in the Interſtices amongſt the Maſſes of ſuch fluids as are fitted, as aforeſaid, ſuch as Spirits, Oyl, *&c.* only with this Difference, that as their Unites or Maſſes are ſmaller, they generally admit the Parts of Fire ſooner, are ſooner raiſed into Flame, and the greateſt Part of the Action is performed in the Flame. In the Heat of the Sun the Actions of fire in fuel, in ſmall Quantity, is weaken'd for want of Spirit to compreſs and ſupply. The Beams of the Sun, collected or reflected by a Glaſs, perform all the Actions of Fire without the Pores of any fuel to ſupport them, other than thoſe of the Spirit, and without the Parts of any other fuel to act with; for Light operates in this Atmoſphere, where 'tis heated by the Sun or in Flame, as it doth in Fuel; makes Vacuums even in the Interſtices of Maſſes, or

Maſſes compoſed of Maſſes of Air, and ſo ſplits and divides them, and thereby keeps up the action or motion. And doubtleſs near the Center of the firmament, or of this Syſtem, where the Compreſſion is equal on each Side, or at leaſt near the Line of the Equator or Ecliptic, the Parts of the Sun may be ſo contrived that none of them may be born off, and that this action may be performed in it without dividing its Parts, and ſo that the action may be always equal. As the Compreſſure of this fluid, when its Maſſes are not divided below a certain Size, nor moved above a certain Degree of Motion, keeps each fluid, fluid, and each Solid, Solid; yet any conſiderable Quantity of its Parts, aſſiſted by Diviſion of the Maſſes and Motion of their Parts, with the ſame Power, can expand any other groſſer Fluid, or any Solid in that Place, whoſe Parts may be made fluid, for Diviſion of ſome of the Parts of Æther, environed and compreſſed with Spirit, makes the divided Parts liable to be preſſed outward to among the larger, and the larger to approach towards their Places; or their Smallneſs makes them liable to be preſs'd between the Maſſes or Unites of other Fluids or Bodies, and divide and move the Parts of the Æther, which filled their

Interſtices, or was at Reſt. Or the Reſiſtance on the Surface of a Body being diminiſhed, when moſt of the Maſſes or Unites of the Fluid which environs and ſhould compreſs the Parts together, are ſo ſmall, that one of them cannot overlay an Interval and preſs againſt two Unites of the Body at once, but will be puſh'd thro' between them, or the force of the Impulſe is increaſed upon a Body or Unite which is in Motion. Be it by theſe or other Manners, the ſmall Parts of the Æther which have been divided by fire, or, &c. can be moved and impel one another in every Direction to a vaſt Diſtance thro' the Spirit, and overcome its Oppoſition and Friction. And if they be reſiſted on all Sides, ſave one, and forced to recede in a Line, they recede with prodigious force. And while thoſe ſmall Parts are in action, they have the force of the Compreſſure of the Firmament, and their Velocity added, and are obſtructed by the Reſiſtance of the Parts of groſſer Fluids, or Solids which happened to be in their Way. But if a groſs Fluid or Solid be placed near the Center, or beginning of the force, or where a Center is formed by Reaction from ſeveral Sides, that force thruſting with greater Power upon the Unites which move outward, and that force being ſucceſſively repeated, while they act they maintain their Ground; keep off the circumjacent Spirit which preſſes upon the Surface of the Place thoſe ſmall Parts act in, and whoſe Parts are divided as they approach inward, drive between the Parts of the groſs Fluid, or Solid, divide and expand them. And when by an abatement of the action of the ſmall Parts, in that Place the circumjacent Spirit preſſes with a greater force than the action of thoſe ſmall Parts can reſiſt; it preſſes out moſt of thoſe ſmall Parts, ſtills thoſe which remain, makes the Parts of the groſs fluids adhere, thoſe of Solids reunite, and the remaining Æther in their Pores reunite into Maſſes, and form Spirit.

They attribute all this expanſion of the Parts of fluids, and the reaction of ſome Sorts of Bodies when bent, to an occult Quality in the fluids and Bodies, they call Elaſticity. In the Unites it cannot ſubſiſt, becauſe if one of them bend, 'tis either not a ſolid, or it muſt become two; and it is nothing in fluids but the Intervention of other Matter, nor in Solids but an Accident. When the Unites, or maſſes which conſtitute a Body, by ſome force, have Parts of their Surfaces divided, while other Parts of their Surfaces adhere, and thereby the

Body is kept bent, and larger Vacuums between the Unites on one Side, than between thoſe on the other; upon taking off that force the Compreſſion of the fluid which had kept them together, puſhes them back, makes the Vacuums equal, and reſtores the figure of the Body. Tho' it is evident this Action of the Light which expands and divides fluids and Bodies in proportional Degrees abates, and in ſufficient Degrees deſtroys that they call the Quality of Elaſticity in any Body whatever.

Well now let us ſee what is preſent to throw a Ball, and perform that which by their Laws is a ſupernatural Action. Suppoſe a great Gun of Copper, Braſs, or Iron, which or whoſe Parts have no other Share in the Action; but as their Parts reſiſt by their Solidity, and the whole directs by its Figure, and a few Ounces of Charcoal or half burnt wood, out of which the fluid Parts are driven, and the Interſtices of the Fibres are left open or full of Air, and perhaps a Pound or two of Sulphur, which is compoſed of Oyl or Bitumen and Salts; the Parts of Oyl being extreamly ſmall, tractable and liable to be opened, and admit the Parts of Fire and the Salt in it, with perhaps a Pound or two of Niter added, all ground together and corn'd, the Parts of the Salts being groſſer than parts of the Oyl and of Air, liable in the fired Air to be toſſed about this Way and that Way, and fret and divide the Parts of the Air readilier than any other Mixture yet found, put into the Barrel, and ſomething which will keep out the groſs Air, and a Ball placed before it, and the Air ready within and without, lying in wait for an Opportunity to act; and a Spark of Air bruiſed and divided by the Colliſion of two hard Bodies in the Pores of a Chip of one of them put to this Mixture, the Parts of the Powder (if well mixed) and of the Air in the Barrel are almoſt infinitely divided, the Ball driven away, the Gun ſometimes broke to Pieces, with a furious Blaſt, nay perhaps murder committed, and no body elſe preſent but the Air, can any Jury acquit it.

Tho' I pretend not now to ſettle Proportions; yet, as others have done about things they did not underſtand; one may aſk a few Queſtions.

How many thouſand Times the Force which Gravity impreſſes upon a Ball at the Time of Delivery, is impreſſed upon the ſame Ball delivered by an uſual charge of Gunpowder; beſides the Force of the

Blaſt on each Side the Ball, if any be loſt which is not interrupted?

Would a Ball Shot perpendicular, ſuppoſe a Mile high, acquire one tenth of the Force in returning it was ſent with!

Whether a Ball ſhot down perpendicular would not acquire as much or more Force, beſides its firſt Force, as when let drop the ſame height, *&c?*

Lightning ſeems to be divided infinitely ſmaller than the Parts of Air in fired Gunpowder, and with what force the Spirit purſues it, which makes thoſe terrible Reports is almoſt incredible. And with what Velocity the Light, or divided Parts recede, and by its Motion either divides the Spirit before it, or drives it aſide; and comes hither ſo ſmall, that it is ſaid, it can pervade the Pores, and melt Steel, and not puſh it forward.

I think here is plain Proof that the Parts of Air next adjoining, impel and purſue every Thing that moves, as well as the Parts of that fluid, as thoſe of other fluids or ſolids here, and if its force be infinitely beyond any Power aſſigned, both artificially in Imitation of Nature, and naturally, what Occaſion have we to ſeek for any occult Powers, but to examine how it acts elſewhere.

And though in Order to deter new Enquiries, it hath been ſtrenuouſly aſſerted, that if the firmament were full, or near-full of Matter, the Reſiſtance to the Motion of Bodies in it by its Oppoſition, Friction, &c. would be inſuperable: I beg leave to diſſent, becauſe the Maſſes compoſed of thoſe Unites which conſtitute the fluid, we call the firmament, at any conſiderable diſtance from each Globe, or beyond their Atmoſpheres, and not near the Verge of this Syſtem, are ſo ſmall, and their Adheſion is ſo weak, that their Obſtruction is very ſmall; may be eaſily divided by one another, or by the Unites. But they, eſpecially the Unites, where they are independant, are ſo infinitely ſmall, that their Strokes upon one another, their Compreſſure and Friction againſt one another, can give no comparative Reſiſtance or Obſtruction to one another, or larger Bodies moving among them; and though the ſmall Parts of Light give Way to one another, or to larger Bodies moving among them; and though the ſmall Parts of Light give way to one another, ſo readily and eaſily, they cannot give up their Space, their Compreſſion upon one another, or upon the Spirit amongſt them, which is ſo ſolid

lid that they cannot pervade between the Unites that compoſe it, is not abated; and I think it is as great or greater upon Bodies in Motion than upon thoſe at Reſt.

And though no Matter can be bereft of any of its Space, or compreſſed into leſs Space; yet I think the greateſt Increaſe of Compreſſure we can give, will not ſenſibly increaſe the Reſiſtance. For if you put Water into a Shell of Metal, and compreſs it ever ſo much, a Body will move in it. Nay if there be ſome fluids, whoſe Parts have more or leſs of Reſiſtance than thoſe of the Water in it, they will upon inverting the Shell, ſeparate, as if the Veſſel were open. And if ſuch a Shell ſo filled with ſeveral ſorts, were placed in the firmament at ſufficient diſtance from any Globe, ſo that the Compreſſion on each Side were equal, the largeſt Parts would go to the center, and the ſmalleſt parts to the outſides, and the reſt in order and form into Spheres.

So we may conclude, that the Unites, which compoſe the firmament by ſome accidents can be impelled, ſo as to adhere one to another, and divide one from another. And where the force is greater than the Reſiſtance, be moved, and move one another, and conſequently thruſt againſt each other, and one with another againſt the Unites which compoſe all other Sorts of Matter incloſed in it, and which reſiſt them in Proportion to the Dimenſion of each of their Surfaces; and with a force on each ſide in ſome proportion to the Extent of the uninterrupted fluid on that Side; with ſome difference, when by Motion ſome Parts of the firmament thruſt more than other Parts. Hence in general, the Unites which are largeſt and near one another, will be preſſed to one another, and adhere the ſtronglieſt together; and ſo in Digreſſion to the ſmalleſt, which will recede, and have little or no degree of adheſion, with ſome Differences by their figures as aforeſaid. And as every Maſs is compoſed of ſome Parts which adhere, and contains ſome which are fluid, the cloſe adheſion of the larger Sorts of Unites, which we comparatively call ſolidity, is an accident to matter, which does not (as hath been thought) make it more difficult to be moved, but on the contrary gives the Spirit which impels, greater hold of the Maſs, prevents more of it, from puſhing forward through its Pores or fluid Parts, diverts more of the Spirits which obſtructs its Motion forward ſideways; and hinders more of that Spirit from paſſing backward thro' its Pores, and obſtructing that Spirit which projects the Body, and divides the Spirit before the Body; makes the ſolideſt of Bodies, each of the ſame Dimenſion, with the ſame force move faſteſt and furtheſt, and with the ſolideſt Part foremoſt, and alſo for the ſame Reaſons ſuffers the Spirit to drive any other Body toward it, ſooner than if it were leſs ſolid; nay much ſooner, than if there were nothing but fluid firmament in its Place. Nay even to drive the Maſſes or largeſt Parts of the firmament to the Surfaces of thoſe conſiderable Maſſes we call Globes, wherewith it thruſts, compreſſes and acts upon the fluids and porous bodies there, which the fineſt Parts of the firmament would pervade.

But allow things happen here as I have hinted, it may be objected, how can matter obey Commandments, keep all things in Motion and Order, produce Seaſons, ſupport Life, *&c.* which hath no Knowledge, or other Qualities, but Solidity. Is it poſſible that Actions produced by mere Accidents can ever be brought within Rules?

I may truly anſwer that thoſe I call Accidents came not by Chance (I exclude Chance becauſe thoſe who admit it exclude wiſdom from God, and Reaſon from Man,) but came by God's infinite Power; directed by his Preſcience and Wiſdom. For I am ſhewing that he hath created ſuch a Number of Sorts, and ſuch a Number of each Sort, of theſe Unites of Matter; each of each Sort of ſuch a Size and Figure; and hath placed ſuch Numbers of each in ſuch Place, ſo mix'd in ſuch Order, at ſuch Diſtances, ſome Parts ſo adhering and ſome ſo fluid, as puts each and all into ſuch Motion and Reſolution, as makes each liable to ſuch Accidents, as the Author, when he had framed and placed them, and ſaid, *let there be Lights*, or *let this or that ſucceſſively be intended*, and ſo they continue to act. For after Things were properly placed, *let there be Lights*, or *&c.* was rather a Permiſſion than a Command; is, *let theſe things be liable to ſuch Accidents as will befall ſuch Things ſo placed.* For doth Man, when he deſigns to produce the Action of Fire, any Thing more than prepare and put a Spark of Light or Fire to Matter whoſe Parts are properly diſpoſed for Fire to act amongſt? Does not the Motion enſue

ſue by Accidents without his taking any further Care, or contributing any further to the Action?

But further, God, who cou'd diſpoſe Things to act, or Accidents to happen, which are conſtantly and regularly the ſame, or in the ſame Series or Rotation; cou'd alſo, by having all Time, all Accidents of Matter, and all the Actions of Man, which wou'd happen or be perform'd, at once in view, ſo Proportion and place matter, that not only ſuch as happen'd periodically, but things which ſeem to come caſually, ſuch as Wind, Rains, &c. ſhou'd all happen to anſwer his deſign in each place, at each Period of time, cou'd know how, where and when every blaſt of Wind ſhou'd blow from the Creation to the Worlds end, infinitely more eaſily and certainly than a Clock-maker can tell, when and what his Clock will ſtrike. Nay, that even thoſe accidents which are contrary to the ſettled Rules, which we call the actions of Nature, ſhou'd happen preciſely in the place, and at the time each of thoſe miracles were of uſe, to be ſhew'd without his interpoſing at the time; and his providence muſt be a continued act all at every point of time from the Creation, and not change as accidents change, or actions are perform'd.

But to proceed, we ſuppoſe that every unite of matter, and every body compounded of unites adhering, placed in any Part of this Syſtem at reſt or in Motion, ſupports and reſiſts thoſe on each ſide, by ſome other Parts of Solid or fluid matter; and when the Parts of matter on one ſide impel the unites or body with greater force, than the parts of matter on the oppoſite, or another ſide reſiſt, it will move as far as thoſe or other ſucceeding parts of matter impel it, with a force ſuperior to thoſe which at firſt or ſucceſſively reſiſt it, and no further. Hence in fluids ſuch as the atmoſphere or firmament where the Maſſes are of different magnitudes, when any ſolid body is impelled more on one ſide than it is reſiſts on another, and put into Motion, it divides the parts of the fluid before it to each ſide; the ſmaller receding backward, and the larger going part forward, partly a ſide, and attempts to leave a Vacuum behind it. And the firmament behind and on each ſide takes moſt hold of the largeſt parts of the Spirit, which are neareſt, driveth them forward againſt the body, and ſo in Succeſſion againſt one another, and ſuffers the ſmaller parts, or the

Light to paſs backward between the Spirit, to take the places the Spirit left, and the Spirit on each ſide of the Line of Motion puſhes in, and the Light ſpreads out of the Line and changes place with it, till they form an equality of the mixture; this preceding and receding may be ſeen perform'd by that impulſe they call gravity. If you fill a bottle of clear Glaſs with ſeveral ſorts of fluids, whoſe Parts are of different ſizes, and cork it, as often as you invert the bottle, the Parts of the largeſt ſort will be puſh'd downward or forward, and thoſe of the ſmaller ſorts will recede between them upward or backward.

If the body impelled be ſmall and porous, or be in form of a ſhell, and its ſides thin, ſo that Maſſes of Spirit of any conſiderable ſize, can in any conſiderable quantity pervade and recede thro' its Pores, the force of the impulſe will be conſiderably weaken'd, and conſiderably ſooner determin'd.

If the impulſe here be againſt the courſe of the impulſe they call gravity, it muſt be greater than that impulſe, or elſe the body will not move at all againſt that impulſe. The impulſe beyond or after that muſt divide a column of the Æther, as aforeſaid, the length of the courſe of the bodies Motion. When that impulſe weakens or hath done, the impulſe they call gravity takes the body again. But that hath nothing or little to do with the Motion of the Planets. And the Parts of the Firmament as they happen to be placed or divided in their turns, may be ſaid to be Agents, Patients or means. Some parts in their turns thruſt the whole; the whole thruſts ſome Parts more than other; thoſe that thruſt moſt, or are moſt thruſten, move thoſe that thruſt leſs or are leſs thruſten, and they that thruſt leſs or are leſs thurſten, give way and remove. Thoſe moving or thoſe moved thruſt and are thruſten againſt, preſs, move and remove, other bodies.

So as the Globes and fluids are placed, where the Firmament thruſts more on one ſide of a body in it, than on the other, the body, be it ſmall or great, muſt move; and when the Firmament preſſes on bodies of different magnitudes, or different degrees of ſolidity, thoſe bodies which are largeſt or ſolideſt move each in the Line where it meets leaſt Oppoſition. Thoſe in the ſphere of the ſun towards his center, and thoſe in the ſphere of each other Globe, towards his center and goes firſt or foremoſt; and if a body have Parts, which have different degrees of ſolidity, upon which part ſoever the impulſe,

pulſe, or as they call it, the projectile force be employ'd, the ſolideſt or groſſeſt Parts go foremoſt, and with their ſolideſt Ends or Parts formoſt, and the ſmalleſt or leaſt ſolideſt recede firſt or foremoſt, and with their leaſt or leaſt ſolid Ends or Parts foremoſt, till each take its proper place, and all attempt to be at reſt; and where the body in Motion is round, and its Parts compoſed or framed, ſo that in Motion the ſolideſt Part can be ſhifted from ſide to ſide; the ſide that is ſolideſt, or that contains the greateſt Number of the groſſeſt parts in the ſame ſpace will have the greateſt impulſe upon it, and will turn foremoſt; and where thoſe groſſeſt parts can ſhift continually, the whole will turn round continually. If a round bowl or body in Motion in a fluid, rub with one ſide upon the plane of a ſolid or groſſer fluid, and that ſide is ſucceſſively obſtructed it will turn backward, and the ſide which hath leſs obſtructions, and is quicklier moved, will turn foremoſt.

But in or upon the Surface of each Globe, where by the Action at the Sun, the Reaction of Light or Heat upon the Side of each Globe next the Sun, Fire here, or, *&c.* the groſſeſt Parts of the Fluid of Spirit, Water, or, *&c.* can be divided till they are ſmaller, than thoſe next above them reſpectively, they will be preſs'd by the others above, recede upward, and yield Place to the groſſer. And if at proper Diſtances from the Sun, Earth, *&c.* the Firmament can in Time compreſs theſe ſmall Parts, and reform them into groſſer Maſſes than thoſe below them, they will ſucceſſively return and form a perpetual Circulation of the Parts of the Firmament, from and to the Sun; of Water, from and to the Earth, *&c.* and one may ſay all Light iſſues from the Sun, yet the Sun is not empty; into the Place from whence the Parts of Light came, thither they united in Maſſes, or Drops return again. And all Vapours iſſue from the Abyſs or Sea, yet they are not empty, into the Place from whence the Vapours roſe, thither they in Drops or Water return again.

So to induce People to be reconciled to the Firmament, we have nothing to do but to ſhew that a Globe may be moved in the Firmament by ſuch Means as ſmall Bodies are moved here. And we ſhall pitch upon this Globe of the Earth for an Experiment.

Suppoſe the Sun be near the Center of the Firmament, or of this Syſtem, and that there is a Motion or Action like that of Fire in it, or about its Surface, which divides the Spirit there, and that ſuch a Quantity of Light ſeparates, and in Motion attempts or ſtrives to poſſeſs more Place than the ſame Unites do when formed in a Maſs or Fluid, Still or at Reſt. That will produce an Attempt to expand, or a Thruſting upon every Part of the Fluid or Firmament, and upon every Thing in it; greateſt near the Sun, and leſs and leſs at greater Diſtances towards the Verge of this Syſtem. By that thruſting or ſqueezing of the Fluid, thoſe Parts divided ſmall, continually fly off between the larger Maſſes, in Lines from the Center of the Sun; and the larger Maſſes are preſs'd towards the Center divided, &c. in Succeſſion. And the ſmall Parts which fly off unite by Degrees at great Diſtances from the Sun, are returned, &c. And the ſeveral Parts of the Firmament are continually mixed, or compoſed of greater and ſmaller Parts in different Proportions, to the different Diſtances from the Sun, except where Bodies interfere. By that the Hemiſphere of the Earth next the Sun, whither the Parts of Light iſſue, and whither the Maſſes of Spirit behind the Earth are hindered from returning by the Interpoſition of the Earth, is filled with Light, and the Reaction thereof divides thoſe Maſſes of Spirit they find there; keeps out the groſſer Parts on each Side, and forms comparatively to the reſt of the neighbouring Parts of the Firmament, what they here call a Vacuum.

Tho' the Precedence or Retreat of the Light, except in very violent Motion, or confined in one Direction, has little Appearance of Force to move ſmall Bodies here, becauſe it is in ſmall Quantities and ſoon diſperſes, yet its Force is near equal to the force of the Spirit which drives Solids here. And when great Quantities of the Light is in ſufficient Motion, and is reſiſted by a Body ſo ſolid or thick that little of it can pervade, and a Surface ſo broad, as that the Spirit on each Side cannot break in, the Force is greateſt where the Agitation is greateſt; and is increaſed as the Supply and Action is longer continued.

At each Inſtant there is a Column of Light in Motion from the Sun to the Earth, interrupted by half of its Surface, and by that put into a new Action. The groſs Parts of Spirit behind the Earth, which return from that Part of the Verge of this Syſtem, being interrupted from returning towards the Sun, by the dark Side of the Earth, forms Night; and that becomes

comes a Column of Darkneſs, or Spirit leſs divided and moved, extending from the other half of the Earth's Surface, ſo long as till Lines drawn by the Sides of the Sun, by the Sides of the Earth, meet behind the Earth, the Reſiſtance of the Baſis of each of the ſaid Columns ſuppoſed to be equal.

Next the ſaid Surface of the Earth towards the Sun, there is a Cap of Light deepeſt near the Center, and ſhalloweſt next the Edges, whoſe Parts by Action, Reaction, *&c.* are more divided than the reſt; ſuch as that upon one Side of the Moon, which, when its Edge is to us, one may ſee plainly white, or like Flame.

The Earth as it proceeds is continually forming a new Part of a Column of Light, and a new Part of a Column of Darkneſs out of that Part of the Frmament next before the Earth, which was before the Earth entered it, in the common Degree of Light; and is continually in the ſame Proportion leaving a Part of the Column of Light, and a Part of the Column of Darkneſs, in that Part of the Firmament next behind, and the Spirit next the Part of the Column of Light puſhes into it, and the Light flies out; and the Spirit in the Part of the Column of Darkneſs beyond the Atmoſphere flies out, and the Light flies in, till they be like the other Parts of the Firmament at the ſame Diſtances from the Sun.

The Rotation of the Earth, Atmoſphere, &c. lets the Edge of the Cap of Light on the foremoſt Side progreſſively begin to act, and proceed by turning the foremoſt dark Edge of the Earth towards the Sun, and by ſtopping the Light ſucceſſively there, and lets the Edge of the Cap of Light on the inmoſt Side recede, ceaſe to act, and become dark, by turning the inmoſt light Edge of the Earth from the Sun, and ſuffering the Spirit to puſh in, and puſh out the Parts of Light. One would be ready to judge, that when part of the Cap of Light is turned behind the Earth, and that the Agitation in that Part in a great Meaſure ceaſes; and the Parts of it being more divided or thinner, than the Parts of the Firmament before the Earth, that the Earth ſhould rather go backward; but the Light can recede thro' or between the Spirit, and let it come forward, but cannot recede thro' the Earth, and let it come backward.

So the Spirit in the lower Part of the Column of Darkneſs left behind the Earth, it being in Motion and Rotation forward, that Spirit behind the lower End of the Column of Light alſo left behind the

Earth, puſh into the Part of the Column of Light the Earth hath left behind, and into the Edge of the Cap of Light the Earth hath turned behind, in two Directions. One will puſh on the Earth, and the other will turn it; and the Parts of Light which recede between the Spirit, ſupply the Places of the Spirit, mix, *&c.* and the new Part of the Column of Light, and new Edge of the Cap of Light, upon which the Earth ſucceſſively comes and turns, being upon the Earth's entring, leſs puſh'd by having leſs Share of the interrupted Light from the Sun to the Earth, and that Light being leſs agitated than the Light, in that Part of the Column the Earth paſs'd laſt over, allows the Earth to incline on that ſide towards the Sun, and keeps in a Circle.

At the ſame Time ſucceſſively the Earth and Atmoſphere, at ſome Diſtance, divide the Parts of the Æther before them, 'tis likely from a Point. The Æther before them being there preſs'd, the Light will recede backward between the Spirit in Lines till they be behind the Middle of the Earth, and the Spirit will be driven nearer together, partly forward and partly on one ſide, and make Way for the Earth. But conſidering the Rotation and circular Motion of the Earth towards the Sun, and the Thinneſs of the fluid on that ſide, I think the greater Part of the Light will recede on that ſide next the Sun, mix with the divided Æther there, move backwards, heighten the Action, turn in after the Earth, ſtill form a new Vacuum behind, and ſtill recede as the Spirit puſhes in, impels or drives the Earth.

So the Earth turns upon the Point of a Column of the Parts of the Frmament in the greateſt Agitation, having its Baſis at the Sun, and its Point the Earth's Meridian; or at the Middle of the Hemiſphere of Light when the Center ſtrikes, or declines on each Side, and ſhifting as its Meridian ſhifts; and the Agitation decreaſes or grows weaker from that Point to each Side, and the Reſiſtance in the ſame Proportion. But the Cap is more rarified towards the hindermoſt Edge than towards the foremoſt, becauſe the Light from the Sun has operated all along from the hindermoſt Edge to the Meridian, every Line having lately been a Meridian; which not only makes the Action greater, the Parts ſmaller, but the Cap deeper towards that Edge, and ſo the Firmament brighter at the Sun's going off, than at its coming on; which makes the Puſh greater on that Side than the Reſiſtance on the other; both by greater force from the Sun while the Action and Reaction continue, and freer and greater Scope for Admiſſion of the Spirit when that Edge turns off, and the Action and Reaction from the Sun to the Earth, *&c.* ceaſes. And this greater force is counterballanced, and the Earth kept from flying out by the Part of the Column of Darkneſs which hath been longeſt at Reſt, and thereby become groſſeſt, or *moſt full of Spirit.*

And as the Atmoſphere by the groſſneſs of its parts is preſs'd to, puſh'd on, and goes along with the Earth, the dark Side of the Atmoſphere behind, and left behind, reſiſts more than the light Parts of the firmament directly before the Earth, and more than the foremoſt Edge of the Cap of Light, between the foremoſt Side of the Earth and Sun, and give hold to the Spirit which puſhes in behind, to drive it and the Earth: and to the Spirit which puſſes in ſloping thro' the Part of the Column of Light the Earth hath left behind, to puſh or ſtrike on a Broadſide, or almoſt perpendicular, againſt the ſaid dark Part of the atmoſphere, and turn the atmoſphere and the Earth, and keep them inclining toward the Sun or in a Circle. And as that dark Part of the Atmoſphere moves forward and is turn'd, the Spirit which puſhes after ſucceſſively, forms and keeps the dark or groſs Part of the Atmoſphere in the ſame Poſition. In this Action, while the Globe or Body is in Motion, the foremoſt Parts of the Light, are puſhed along after it, while ſome of the hindmoſt are receding, and the foremoſt Spirit, taking the precedence of them, and the firmament by the foremoſt parts of the Spirit puſhes againſt the foremoſt Light, and with it againſt the Earth, as much as if each of the foremoſt Parts of the Spirit ſtill puſh'd againſt the Earth by touching it, otherwiſe the Spirit would produce a Motion like Wind at the Surface of the hindermoſt Part of the Earth.

There is another Accident within the Earth, which is one of the principal Cauſes of its diurnal Motion or Rotation, which belongs to another Treatiſe, which cannot well be given in Epitome, or by Pieces, I mean the Motion of the internal Globe.

The Weight of the Globe of Earth is nothing, becauſe it hath no Tendency or Gravity to any Point, is no Burthen to the Carrier, no more than an empty Shell of that Size, whoſe Sides would reſiſt and keep out the Æther, as much as the Earth them does, would be; if ſuch a Shell and ſuch a Void could be.

So a force neceſſary to move a Body in the Firmament, needs only ſqueeze out the Light from before the Body, and make them once or ſucceſſively return or recede to behind the Body; and the Spirit which puſhes after and impels the Body, will puſh in amongſt that Light, and puſh it backward and outward: Nor does the Size of Bodies make any Difference, only the Places full of Light, or as they call them Vacuums, ſhould be in Proportion to the Body moved, further divided or enlarged for increaſing the Velocity, and renewed to continue the Motion.

I have not attempted here to ſhew how great the force of the Compreſſure of the Firmament is upon the Unites of Solids, or Fluids; nor intended, except as it comes in occaſionally to explain the other Operations, which I have in general attributed to this fluid, but only ſo far as was neceſſary, to ſhew that the Parts of this fluid, as they are more or leſs divided in one Place than another, have more or leſs Degrees of Reſiſtance, produce Motion, and move Bodies in them.

The Obſervations and Experiments which have been offered as Proofs for Attraction

traction and Elaſticity in Solids, are Proofs for Compreſſion. Thoſe for Elaſticity in fluids, for Separation of their Parts by the Intervention of other Parts, which produces that Expanſion. I have mentioned only a few Experiments which have been made to prove the eſtabliſhed Doctrine to prove the contrary. If a new Apparatus of Inſtruments were made to prove this rationally, Things would appear in a rational Light to a common Capacity; and I think I may venture to ſay, that all the Phenomena in inanimate Nature will anſwer to this, without any Exception or By-Law.

I attempt not to detract from the Praiſe which is juſtly due to thoſe, who by diligent and conſtant Obſervations and Calculations, have aſcertain'd the Proportions or Meaſures of the Motions of Bodies, but only to diſcover the Cauſes of thoſe Motions, which I think none ever pretended to ſhew.

UNITES of ÆTHER.

I Am not very well ſatisfied with the received Notions about Light, Warmth, Heat, Fire, Cold, Darkneſs, *&c.* Nor have I had ſufficient Opportunities to make ſufficient Experiments and Obſervations therein; but ſhall offer a few Conjectures to ſee how they will ſquare with Obſervations already made, and thoſe which may be made hereafter.

The Corpuſcles of this fluid are ſo infinitely ſmall, that they are not to be meaſured, becauſe they are ſmaller than the Pores of any Body. Thoſe in Maſſes or Air, cannot paſs the Pores of any Metal or Glaſs, nor ſcarce any fluid, and reſiſt groſſer fluids from entering where they are; but it is evident the Corpuſcles of this fluid, in ſome Degree of Agitation, can pervade the Pores of any Body or Fluid. And if they are included in any Veſſel never ſo cloſe, they can make their Way out; ſo that the Veſſel will admit its fill of any other fluid. And this fluid can never be prejudiced by violent Agitation, or being fired; becauſe its Parts or Corpuſcles are ſo ſmall, they can only be divided from one another, and alternately agitated in a greater or leſs Degree, kept further aſunder by thoſe of other Fluids or Bodies, or come nearer together. If the Corpuſcles be infinitely ſmall or pointed, the friction among themſelves muſt divide thoſe which unite, and enter the Pores of other Bodies or Fluids in it, according to the force of the Impulſe.

This fluid ſeems to be the Compliment to all other ſorts of Matter, and fills up the remaining Space or Vacancy in the whole Univerſe; not only the Space from the Sun to all the Globes we can ſee, and the Spheres in which they move, but the Interſtices or Pores, in all even the moſt minute Parts of Matter, fluid or ſolid, and there muſt be ſome Millions of times as much of this, as of all other ſorts of Matter within our Knowledge. For it permits no other Vacuum, but that the Corpuſcles next the Sun or Fire, are moved and divided by their violent Agitation; and leſs, as that Agitation leſſens by Diſtance; and ſtill leſs behind Clouds, denſe Vapours, or ſolid Bodies that interfere; leaſt, where there happens a total Eclipſe; or on the dark ſides of the Globes. The Space between the Sun and the Surfaces of the ſeveral Globes next it, is always full of this fluid in form of fire near the Sun, and of Light nearer the Globes, and ſucceſſively ſupplied with new Light; and that fluid fills alſo the Spaces near the Globes, which are dark, cold, or frozen. Its Appearance and Action is changed, only as it is differently divided, agitated, or at Reſt.

'Tis, they ſay, evident the fluid Air let into a Receiver, can be compreſſed into part of the Space it contains in the Atmoſphere; ſo, if that were true, there muſt be a ſubtile Fluid to fill the Interſtices, or elſe a great part of the Atmoſphere muſt be empty Space; ſo I think the Unites of that fluid, are infinitely ſmaller than the Maſſes of Air. That the Corpuſcles of Light, Warmth, Heat, Fire, Darkneſs, Cold, Froſt, &c. are material, will not be denied; that their Unites or Maſſes are free from one another, and have the Qualities of what we call a Fluid, will be eaſily proved. That one of the Corpuſcles being moved, can move another, is demonſtrable; that they exiſt, when we perceive them not by their Actions, follows. If we allow Light to be material, can we imagine that it goes back to the Sun or Fire, when any opake Body intercepts it in a Line; muſt it not reſt in the Place or Space till its Action be renewed. When the Corpuſcles of fire are put into Agitation or Action by the Sun, or Art, and any Thing obſtructs their Courſes here in this Atmoſphere, they continue ſo for ſome Time after, and incline to Reſt leiſurely, which proves they are preſent after the Paſſage from the Sun, Fire, or, &c. is ſtopt.

Darkneſs, *&c.* (*Gen.* 1. 2.) implied, that the Air was inactive; there was not that OEconomy which was to ariſe from Motion, and as they render it, the Heavens were not garniſhed.

The Air is framed to enforce the Gravity or Compreſſure of this fluid upon Bodies (eſpecially Animals) which are ſo porous, that it would pervade them; and increaſing, it increaſes that Power, *& e contra.*

The Æther with Air, is ſtronger than that without Air; therefore Fluids are driven up between Glaſſes up Tubes, *&c.*

A Bladder extended by Force in the open Air, and its Mouth ſhut with the ſame Quantity, or Air within, as is contained in the ſame Space without; I think when the force which extended it is taken away, will be preſs'd near together. If half, or all the Air were included in Bladders, what then would make them run up? When you force in Air and Æther, the Æther goes through, and the Air ſtays.

Whether Air be *Æther or Light* congealed, may be proved by heating a ſphere of Metal cloſed full of Air, and trying whether it willl rarify and paſs the Pores, ſo as it may be beaten together.

Incloſe Air in a Shell of ductile Metal, and hammer it till it be exceſſive hot, and that will divide the Air, if Heat will; and if the Shell can be beat 'till it be ſolid without burſting, the Air is the ſame as Fire. If it were heated the Parts would be more open, and if the Parts of Air did not divide by the Fire, they would iſſue out at the Pores.

Fluids are not capable of keeping a Form, becauſe they conform to the Surfaces of every thing formed. If the Particles of the Fluid are round or near round, they ſlide or roll upon the Surfaces of one another, the larger the Maſs, the nearer the Surface approaches to a ſtreight Line; and the ſmaller the Body is, the more acute the Angles of its Edges are, and ſo give leſs Reſiſtance.

If this Fluid did not pervade Water, how could a Body ſink in Water, when the Pillar of Water is fixed at Bottom.

The Interſtices of the Earth, Water, &c. being always full of Æther, the Æther without, preſſes with it perpendicular, upon the Æther in a Drif, in the Mines, or &c.

The *Light* acts upon each Corpuſcle of Body, or Fluid by its ſelf, but works upon the Surfaces of ſuch Compoſitions of

Matter as animal Bodies are, with the Atmoſphere or Air.

Divided Æther comes up through Water without Bubbles. —— too groſs or too ſmall below in the Mines.

As we move, the Æther moves thro' us.

BUHUN of the WIND.

HE ſeems to prove that the Wind may be explained by Hydroſtaticks; that where the Vapours out of the Earth, Sea, *&c.* are heavier or thicker than the neighbouring Air, they preſs thither and produce that Motion we call Wind. Near the Line the Vapours being raiſed more at Sea than Land by Day, or the Heat of the Sun, the breezes come from the Sea and refreſh the Land. The ſame vapours with thoſe raiſed out of the Land, by Night flow towards the Sea, *&c.* and when the Sun is near the Line, the vapours generally follow the Rarification made by the Sun. Ex. G. if a hot Bullet be moved over Water the cold Air flows to the place rarified; they have their Winds blow generally one way for near Six months together near the Line. The Winds are not ſo conſtant here, but are hindred or directed by Mountains, Seas, the Sun's diſtance, &c, He obſerves that the Winds from the Seas. &c. are warmer, moiſter, &c. than what come by Land; that the Winds often rebound again when they have over ballanced the place whither they flow'd, as our Weſt and South-Weſt Winds here from the vapours that preſs to the Rarification in Summer, and the North and North-Eaſt with draw in Winter; that they take their qualities from the matter they come out of, or over, *viz.* coldneſs from ſnowy Mountains; Heat, from hot Sand, Mineral ſtream, &c. when they come thro' ſuch in the Earth.

Obſerve whether the vapours preſs to the place rarified, or to that, from which the heat, having rarified and expelled the vapours, is withdrawn; or whether the Earths Motion removing the part rarified from the Sun, the vapours following, when there is any weſtward, and being aſſiſted by the Expulſion of the Sun's heat upon the place further Weſt, be not the cauſe that onr Weſt Winds are ſtronger than the Eaſt in Summer; or whether the depreſſure of the Clouds, or Exhalation of Vapours out of the Earth, do not ſometimes force the Air to the place, on which ſide it is leaſt preſt.

A Cupping Glaſs defends the parts it covers from the Air, and the other parts being preſs'd, cauſes the Pain.

Doth the Wind move as Water doth which carries a Body with it, or does it only move the Body which reſiſts it, and follow it in that Line.

The thin Æther reſiſting, returning, or recoiling, makes the Puffs and Guſts in the Wind, and the groſs parts being driven down to the Earth, interrupted by the ſurface of the Earth, move along the ſurface. If they were from the ſurface they wou'd diffuſe.

Conſider how the Clouds being raiſed higher in the Heat of the Day, and brought lower by the cool of the Night, and being lower at each Pole than at the Equator will move the Air, and produce that Action we call the Wind blowing.

When Vapours ſink Rain falls, or Winds blow. The receeding Æther and perhaps ſome Volatile parts of ſulphur or *&c.* which alſo recede, may produce fire and that ſound.

The Wind either moves the fluid and leſſens the gravity, or its force contends with the Preſſure of the fluid, and it is never too ſtrong for Gravity, which is a great Proof, that it is mov'd by the ſame Agent and ſame Action.

Can the Wind blow from different Points, as North and Weſt, or a more obtuſe Angle, ſo as to force the Parts of a Cloud together, and what makes Wind come almoſt regularly in Guſts or Waves? When the Wind ſtrives to blow two ways oppoſite or near, and changes Sides, it makes the Vapours unite and fall in Rain. If Wind blow always one way, as in *Egypt*, or where it blows one way a long Time, Rain at change.

The Eaſt Wind, they ſay, blows nine Months to the Bay of *Mexico*, and makes a greater Current in the Gulf. But the Current is even in the other Months. Does not the Eaſt Wind bring the Maſſes of Æther form'd in the Night? When the Wind Blows, or the groſſeſt Corpuſcles in the atmoſphere come from the Eaſt or North, the Æther divided by the Sun, recedes from the Weſt and South to the Eaſt and North. When the groſſer Parts proceed from the Weſt or South, the ſmall Æther recedes, or is ſtopt from proceeding Eaſt and North, and is multiplied here. The North and Eaſt abate the action in animals and Vegetables. The South and Weſt forward it.

Æther may enter the Sea by Day in Heat, and riſe in Parts united in the Night, and cauſe Wind, eſpecially in the hot Climates.

To know the Cauſes of the irregular Winds, there ought to be true journals kept of thoſe which are conſiderable, at what Time they begun preciſely at each Place; what Appearances there were in the Firmament, ſome Time before, and then, on every Side; what Rains had fallen, .what Clouds appeared, whether the Sky was dark, or clear, *&c.* how far the Wind extended, how long it continued, what alterations happened from firſt to laſt. And thoſe Journals ſhould be communicated and compared.

A Turnado is a Guſt of Wind, which begins upon a ſudden Turning of the Wind at Sea near the Line, laſts about an Hour, is only near the Line, extends ſometimes into the Iſlands. Qu. How far? If they do not ſtrike the Sails, they will overſet the Ship.

Wind may break the Maſſes by blowing and ſo reſt; or may diſperſe and divide the Clouds and Clouds form Wind; or expanding of the Matter in the Clouds may form wind.

Do the groſs Parts which miſs the Earth, and paſs by its Sides towards the Sun form any Motion on the Surface, or among the Clouds, at thoſe Parts of the Surface of the Earth, which are at right Angles with the Zenith of the Sun. See how the Trade Winds are.

One ſhould conſider what Quantity of water the wind detaches in a hot Seaſon, and as it is raiſed and driven along with it; what alterations will be at the Place whither it is driven.

It is much ſafer to have the Air to come to a Fire one ſits by, from divers Points, than in one Stream.

Veſſels or Places filled with groſs Air, condenſed Air, or Vapours.

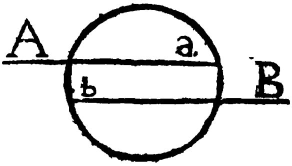
WHEN one hath pumped in as much Air as one can, heat it, and one may pump in more cold Air, and I think one may pump in hot Air *ad infinitum*: it will get out.

Whether (if a Receiver were made very thick, or were ſunk in Water) when Air is pumped in, would that which comes out paſs unſeen, or appear in the Water up at a ſmall Neck of a Veſſel; or would it hinder Air from going in, when the groſſer is pumped out.

If a thouſand of Unites of A's, and a thouſand of B's, the A's adhering in Tens, and the B's divided fill a Veſſel, each poſſeſſing an equal Share of Space, and each of the ſame Figure; the B's take up more place than the A's; and if the B's be divided, and the A's adhere in Tens, the B's will then take up more Place than the A's, and ſtill more in Motion among themſelves, than at reſt. But the Pores of any Veſſel we can frame, admit Unites of ſome Sorts to paſs in or out, therefore we can make no Experiments fairly, between Expanſion of Matter in a Veſſel, and in the Firmament.

This Expanſion of any Fluid, where a thinner is without; by entering of the Parts of the thinner, keeps the groſſer Fluid in a State of Fluidity at a certain Degree, and if the Action of the thinner Fluid be hightened, will expand the groſſer; if abated, will make or let it ſtorken or freeze. The Maſſes of the Æther are large, and the Mercury riſes when, and where it freezes.

When a groſs Fluid is expanded by the Parts of the lighter from without; the Parts of the groſſer Fluid ſo diſtanced till they are ready to take up more Room, can be carry'd off thro' the thinner Fluid. Where Maſſes of air are included in a Veſſel groſſer than thoſe next without, the Preſſure of the ſmaller Parts without on the groſſer within, with the aſſiſtance or Continuation and augmentation of that Preſſure with the groſſer, is greateſt upon thoſe groſſeſt Parts on the oppoſite Side of the Veſſel each way, ſo that the groſſeſt on each Side, or next the Inſide of the Veſſel, is moſt preſt towards the thinner or ſmaller next without, or on the Outſide of the Veſſel; as A preſſes moſt at a, and B moſt at b.



It is this addition of the groſſer Parts within the Stomach, Guts and Parts of Animals, which enables the Preſſure of the Æther each oppoſite way, to make thoſe groſſer Parts of Fluids and Steam in

Animals puſh forwards and outwards, circulate, and extends the Veſſels; and where a Veſſel is open'd, burſt out, and thereby prevent the Preſſure of Æther without, from preſſing the Parts of the Veſſel one againſt another, ſo as to cauſe Pain, &c. where that Motion is ſufficient. And to ſuffer the Parts to be preſſed in, cauſe Pain, Contraction, Death, &c. where it is not.

The ſmall Parts, or Æther in Steam, will ſupport as many ſmall Parts of Water as is counterpoiſed by the Air without, beſides the Velocity of the Motion.

When Parts of Water are fixed to Parts of Air, and rais'd into Steam, that the Maſſes paſs by one another without adhering, as dry Maſſes of Air do, the Æther which enters, can expand, or force them outward, much ſtronglier than Maſſes of Air in ſome Proportion as they are larger, and ſo in Plants, Animals, &c. and this they do each way, from ever ſo ſmall a Diſtance from the Center; and, I think, thus they diſperſe humid Clouds.

The common Action of the ſucceeding Æther, can enter and expand Air compreſs'd in a Veſſel. A greater Action of it can expand Water. Any Thing can be expanded by ſome Degrees. So air is expandible with one Degree, Water with another, and any Thing with ſome Degree.

The ſmall Unites of Æther, which pervade the Side of the Veſſel fill'd with thoſe of groſs air, puſh them outward in every Direction.

The air without preſſes upon the air within a Veſſel by Communication, as much thro' a ſingle Pore, as if the Hole were ever ſo wide, and keeps Things as cloſe as if it were a real Solid.

Beer and warm water extend in Vacuo as air does, which they term Elaſticity.

If you put a Creature in a Glaſs, remainder fill'd with air or water, ſeal it, and put it within another Glaſs, the air extracted, the Æther will work with the atmoſphere, compreſs the Body, and expand the Fluids, and burſt the Glaſs. Try different Degrees of Air, of Heat, &c.

The Expanſion of the Fluids in an Animal, or any other Compoſition in Vacuo, is a Proof, that there is ſome other Agent than the ſuppoſed power of Gravity or Attraction, which impels the Corpuſcles of thoſe Fluids, makes them divide one another, take up more Space, expand, and fly off; and that that Agent pervades the Air Pump, is preſent in every Part, and acts upon the moſt Minute Corpuſcles with a Force infinitely greater than the ſaid imagin'd Power, and acts upon as much ſolid Matter. And likewiſe, 'tis a Proof, that the Agents which execute this Force, are directed in Lines from every Point in a Sphere environing the Place of Action, and that the Force exerts itſelf in Lines to every Point in that Sphere, from the Center or Centers of the Place of Action.

Tranſlation of *Newentit*, 608. "Breath will not ſupport the burning of a Candle, (nor I believe hot Air) a Candle may be made to burn a long Time by admitting a little Air," as at Tab. XV. Fig. 2.

The larger Maſſes are driven into the Vacuum, on opening the Bellows.

Cold Water thrown upon the Surface of a Veſſel full of Steam, interrupts the Action of the Æther from the Outſide.

When the Parts of the Air are ſmall, Steam riſes, and the Glaſs falls, and *E. Con.*

Diſſolution of Bodies by Air, &c.

NAtural Agents, ſuch as Æther, Salts, Water, *&c.* and their Actions upon one another to waſte and decay Metal, Stone, Wood, and all other Materials.

Aqua Regia diſſolves Gold and all Metals, except Silver. *Aqua Fortis* diſſolves meer Silver, and all Metals except Gold. Alkalics precipitate Silver in an acid Menſtruum, put in ſlowly; will the Menſtruum be clear, which was white.——

Corroſiveneſs. That the Menſtruum abound with Corpuſcles not too big to get in at the Pores, nor too ſmall to paſs thro' them, as the Beams of Light do Glaſs. That they have a proper Shape to diſſociate the Parts. That they have a competent Degree of Solidity to disjoyn the Particles. That they be agile and fitted for Motion, by which, and the Preſſure of the Air, &c. they are forced in like Wedges or Levers. Wine, Ale, &c. ſheath the acid Particles when new; which, in Time, its conſtant Motion unſheatheth. I think, few Liquors are ſharp, that are let die on a ſudden, without Time, Heat, &c. Honey may be fomented with water to good Vinegar. Heat aſſiſts the Menſtruum, and ſometimes it cauſes Heat in the Operation. A Menſtruum may be too ſtrong, and diluting helps it.

Corroſibility. That the Bodies be furniſhed with Pores of ſuch a Bigneſs and Figure, that the Corpuſcles of the Menſtruum may enter them, and yet not be much agitated, without giving briſk Knocks and Shakes to the ſolid Parts that make up the Body; that its Corpuſcles be of ſuch a Bulk and Solidity, as does not render them incapable of being disjoyn'd by the action of the inſinuating Corpuſcles of the Menſtruum. That the Coheſion be not too ſtrict to be ſeparable by the Menſtruum. It may be prepared by Fire, as Calx, &c.

The Unites which divide, muſt be ſmaller than the Maſſes divided.

If a Maſs of Stone or Metal were placed ſo near the Sun, that the Æther without, were as thin as the Æther within, the Unites wou'd fall aſunder.

The Diſſolution of the Unites of Bodies by Fire or Salts, is aſſiſted and haſten'd by the Motion of other Unites of proper Sizes, to enter and divide the unites of the Body they operate upon.

If the Parts of ſpirits be ſmaller than the air, they will not diſſolve ſalts, ſugar, &c.

The Difference of theſe Pillars (*viz.* of Light and Spirit, which compreſs every Thing) makes the Salts and all angular pointed Bodies and perhaps Fire, be driven into and divide the Corpuſcles from a Maſs of Matter, becauſe the Pillars which drive it in are infinite; thoſe which pervade the Maſs are weakned. If the Maſs be near the Globe, they work more upon the upper, than the under Side. This holds in the Stomach, and they work more in the Summer in the Day, or when that Agitation of the Light is ſtrongeſt. What do Acids and Alkalies mixed, in Vacuo? If they work, this is the Agent.

Sugar form'd in Maſſes, is ſoon diſſolv'd by Water; that melted on the Fire, or form'd in Shoots not ſoon diſſolved, becauſe the unites are uniform, and Parts of water as large as thoſe of Sugar.

Velocity, or Increaſe of Force.

BOdies do not acquire Velocity by falling, but as the Oppoſition abates; nor do they acquire Velocity in any other Direction, or by any other Means, but quite the contrary.

One might make a Proof with what Force Bodies fall from different Heights, by fixing a Spring with a Bag at its End for them to fall into, by marking, firſt, by Weights put in, and Lines made, how far it would ſink at each Weight, by rubbing Butter, or ſuch ſoft Matter upon the Side of the Ruler, and letting it rub off as low as it ſunk each Time; or by fixing Weights in one End of a Scale, and a Bag for the Weight to fall into at the other End, and a Pin to ſtop the light End from riſing. This may be done by a Spring horizontally, for ſhooting Balls to prove their Strength at Diſtance.

Qu. Whether a Fly, ſuch as they Coin with, ſet forward by the Puſh of a bent Spring, would not, after it had gone by a Cord in a Pully, lift a greater Weight than the Spring which ſet it forward, would lift in the ſame Manner.

Rebounds.

REbounds of a Body projected againſt a Solid, muſt be performed in the ſame Manner as the Reflection of Light, and by the ſame Means; for as the Body diſplaces the Fluid in its Motion forward till it is ſtopt againſt the Solid, and forced by the ſucceeding Corpuſcles to move backward (all being preſumed to be near full, and when one Part fuller than another ballancing itſelf) that fluid which returns muſt carry the Body backwards when it is ſtopt.

What we call Rebounding, and aſcribe to the Elaſticity of the Solid, the Body ſtrikes againſt, muſt be either the Æther which paſſes through the Body ſtricken, or the Æther which puſhes the Corpuſcles on the Surface, removed in Part from their Places back again, or both. Rebounds are aſſiſted by the Æther, which pervades thro' the Body ſtricken upon. The receding Æther makes a Recoil when a Body is ſtopt by a Solid.

Æther, which in its Motion ſtrikes upon a Solid, rebounds; or by being puſhed on by that behind, takes another Courſe, and moves back, and drives that back which is diſtant from the Solid. This is what Sir *J. N.* dreams of Light returning before it comes to a Solid.

The Rebound of a Body, whoſe Motion is ſtopt by a Solid, is occaſioned by the greater Preſſure upon the groſſer Maſſes of Æther before, then of the ſmall ones which are returned behind, which puſhes the Body back into the Vacuum behind.

The Foil which Wool, *&c.* gives to Balls, proceeds from the Reſiſtance of the oppoſite Æther, and from the Breadth of all the Parts which move againſt it with the Stroke.

Recoil, or when Solids, or the groſſeſt Parts of the Air, are moved or puſhed towards a Solid, it produces an Inequality, or brings more groſs Parts thither, than there are in the Spaces behind; and the Æther puſhes them backward, or back again into the Space full of ſmaller Parts behind, till an Equality be produced. And that Motion is repeated ſeveral Times, like a Vibration, till the Parts are mixt.

Make a looſe Frame with a Spring fixed to it, and try how far an horizontal Recoil of a Gun will move it, and then try what Weight will move it as far in a perpendicular Poſition; but a Recoil may ſhake the Hand by too quick Motion.

Adheſion.

IF Adheſion or Solidity, Gravity and Elaſticity, proceed from the ſame Cauſe, then there can be no comparative Proof or Tryal, of this different Degrees at different Times; or in different Places. Perhaps the Light preſſes the Air againſt the Surface of every Body, and ſo keeps thoſe Surfaces together, which will part when the Light only ſtrikes, and pervades between the Surfaces in Vacuo.

Unites which are flat, or broader one Way than the reſt, and of Size larger than thoſe of the Æther which preſſes them, will adhere, becauſe the Preſſure upon the outer Surface is greater than upon the inner, which touches; and the Preſſure upon the Surfaces of one ſide of their Edges, is not equal, but leſs than that which is upon the outer flat Surface; and ſo of oblong, or what we call fibrous Parts. But if the Unites be round, the Preſſure upon any ſide will be equal to that of the outer ſide, or any other ſide, ſince 'tis only poſſible each can touch in few Points: And for that Reaſon they will always be liable to be moved, one upon another, and thereby be looſe or fluid, as Mercury, *&c.* and likewiſe to be raiſed by Fire, when there is a Vacuum behind them. State this, notwithſtanding they touch in one, two, three or four Points: And likewiſe with Reſpect to that they call their Gravity, and conſider the Figures of the Unites when ſo large, as that they may be proved. Judge not according to the Appearance, but judge righteous Judgment.

I believe if two Bodies of ſix Inches Diameter, entirely ſolid, were placed at a ſufficient Diſtance from the Earth near one another, they would be driven to one another with that Force, that they would cruſh a Diamond of that Diameter between them to Powder. And two Corpuſcles, at an infinitely ſmall Diſtance, whoſe ſides are plain and ſmooth, are driven together with an incredible Force, as appears plainly in the Elaſticity of a Spring, and it is likely 'tis thoſe Figures only which are ſo elaſtick; or Plates compoſed of them in that Figure, that leaſt Æther pervades, are moſt ſo.

To make Corpuſcles of Matter adhere to one another when they touch, nothing is neceſſary, but that their Figure admit their Edges to join, ſo cloſe, that the Corpuſcles of the Fluid, in which they are contain'd, cannot preſs their Inſides with ſo great a Force, as they preſs their Outſides.

Different Sizes of different Fluids, have different Effects upon Bodies they incloſe. Thoſe which are ſo ſmall, as to be preſſed between, expand or divide. Thoſe which overlap the Pores and preſs upon two or more unites, make the unites adhere; ſo water makes thoſe unite which Air will not. Air thoſe which Fire will not. And *E Contra*. Comparative Sizes between the unites of other Bodies. And Air, or Æther, makes them adhere or keep cloſe.

In uniting or dividing Bodies or Fluids, there are three Proportions to be conſidered, the Size and Figure of the Unites or Maſſes, which compoſe the Body or Fluid; the Sizes of the Parts of the Æther among them, and the Sizes of the Maſſes of the Air which environ them; and if they be incloſed in a Caſe, the Size of the Pores of that Caſe. The Cloſeneſs of Adheſion is comparative to the Sizes of the Maſſes of Æther, and conſequently to the Action of the Æther. Compreſſure of the largeſt Maſſes of Air is upon the Surface, becauſe the Unites there are moſt liable by Friction, &c. to be ſeparated. The large Maſſes of a Fluid can compreſs looſe Parts which are ſmaller, and if they are ſuch as will adhere, unite them. But a Fluid of Maſſes, ſmaller than thoſe looſe Parts, ſo much that they can preſs in between thoſe looſe Parts, will diſſolve them. When a ſolid Body or groſs Fluid is compreſſed with another Fluid, compoſed of a Mixture of large and ſmall Parts, the larger are puſhed to the Surface; and the Preſſure upon them being greater than that upon the ſmall ones, the Body or groſſer Fluid is kept together; but when one of them is preſt only with ſmall Parts, and the larger are kept out, all the Force lies upon them, and they, if they be ſmall enough, enter between, expand, divide, &c.

If a Globe of ſolid Unites as large as Peas of any Diameter, were environed by a Sphere of Unites as large as Beans, and violently puſhed in inward upon every

Point, the Unites of Peas would keep their places, and the Globe its Figure, as if it were one ſolid. But if the Peas were environed by a Sphere of Mullet Seed, and compreſſed as aforeſaid, the Seeds would be forced in among the Peas, and the Peas puſhed outward into the Sphere of the Millet.

And as the Unites are larger, their Surfaces approach nearer a ſtreight Line, and give the greater Reſiſtance; and are leſs Fluid. Compariſons between theſe and ſmall ones repreſent them not in that point. Sometimes a third fluid, as Water is neceſſary to make the Parts of Powder of Stone, to unite.

A Body of large Unites broken aſunder into Maſſes, or ſeparated by the Action of ſmaller Unites, if in the air, are mix'd with maſſes of air; if in ſmall Æther, with thoſe of ſmall Æther. If the Æther amongſt them be ſmall, and the air preſs upon their Surfaces, it drives them together and unites them, as in melted Metal *&c.* If the air amongſt them be as groſs as that which encompaſſes them it will keep its Place, and the large Unites will not unite. When Water is mixed among ſome Sorts of groſſer Unites, and perhaps ſome of ſmaller in a ſmall Proportion, its Parts keep out moſt of the air, and forms a Maſs partly ſolid; and the Parts of Water are, if the Maſs be large, preſſed out; if ſmall, the ſmall Æther, eſpecially when in action, detaches or drives them out one by one; and ſo the groſſer Unites are driven together by ſlow Degrees, and ſo, that no Vacancies are left for the Maſſes of groſs air to enter. When the Water is taken out of a Maſs of Powder of Stone, or Mixture of Clay, *&c.* (whoſe Parts are divided, beat ſmall and mixed) by a hot Fire, it lets them come ſo near together, as nothing, intervenes but the Unites of Æther; and if they are forced out ſuddenly ſtill cloſer; and the Maſſes of air cannot enter. But if thoſe Parts of Water, are taken out by ſuch Parts of the Air, as are in the Mixture in hot Weather, Maſſes of the Size which drive out the Water muſt remain. And if they be ſo ſmall, as that there is not any ſmaller in the Atmoſphere, the Parts will keep united; but if the Maſſes of Air left in them, be divided by the Interpoſition of ſtill ſmaller, the Parts divide, and become Powder. If the Maſſes remaining after the driving out the Water, be ſo large, that the next Parts of Water can be preſſed into their Places, they by Degrees diſſolve the Parts. In winter, or thick air, when the Parts of water ſo lodged among the Interſtices of Powder, are ſmaller than the Maſſes of the then Air, the water keeps its place, and as we ſay the Body doth not dry. Water among ſmall Bodies is the Cauſe of *Adheſion*, till the Æther puſh and hunt it out; after that if the Parts come near enough together, they ſtick. When large Unites, ſuch as Clay, are put into the Fire, the Parts of the fire divide thoſe of the Water, and perhaps many of thoſe, of the Maſſes of Clay, and drive out thoſe of the Water, Vegetables and other ſmall Parts, and the Compreſſure of the Firmament makes the large ones come cloſe, and the ſmall parts of the Fire recede and ſuffer them to come cloſe, and the Air keeps them ſolid. Strata or Nodules of Stone at the Flood were formed in a thin Æther, whoſe parts were ſmaller (mixed among thoſe of water and ſo ſmaller) than thoſe of Water, and conſidering them as they truly are Solids, they kept the Unites or Maſſes of Stone no further aſunder, or made what we call the pores no wider, than their Dimenſions. So the Corpuſcles of water can but be preſſed into very few of them, whoſe Maſſes are large. But counterfeit Stone which is made in the Air, whoſe Maſſes are larger than Unites of water, will admit them. I think 'tis helped by making the water hot, and the Air ſmall. And this is the Reaſon why the Corpuſcles of Metal diſſolved in Spirits will not unite, but will in the thin Æther or fire. Water aſſiſts in keeping out the parts of groſs air, and its parts are divided and carried out leiſurely by the thin Æther, ſo that the groſs cannot intrude. A great degree of Cold or Heat have each the ſame Effect in rendering Things ſolid. Whites of Eggs though after a different Manner. Froſt makes all the Maſſes groſs from ſmall Unites. Heat takes away all the ſmall Unites. Froſt ſeems to be the oppoſite to Fermentation. If the action of the Æther from below were totally ſtopt, or if its Force were equal to that above, which would contribute moſt to attraction of fluids, Heat or at Froſt? When Particles of Water are preſſed down, and there are no thinned Corpuſcles of Æther to ariſe, and thin thoſe that fall, they freeze.

Froſt is ſuffered by a Ceſſation of that Motion in the Æther, which is produced by the Sun, Fire, or Fermentation, and reflected backward, and forward, and Side-ways by the Surface of the Earth, or other Matter. The Vapours from the Earth have little Effect where the Hail-Stones and Snow are formed; and the Sun hath equal Power, but in one Direction there is no Reflection.

The Unites of Mercury, and the Maſſes of Silver in Leaf worked together, make a body with Degrees of adheſion, in Proportion to the Smallneſs of the Intervals, and to the Dimenſions of their Surfaces which touch one another; ſo does artificial Stone, Clay, Mould, *&c.* If a Stone, Signet, or Glaſs, be heated through, the Wax will cleave to it; while 'tis heated, there is a Pervaſion of the Æther.

Vegetable Parts and Water adhere in boiling, by dividing the vegetable Parts ſmall, and the Maſſes of air which interven'd, and let them from adhering.

Projection.

WHen a ſolid Body is put into Motion, by the Expanſion of a Part of this Fluid confined, within ſome hollow Caſe of ſolid Matter, and mixt with other Fluids, as Air, Water, *&c.* by which it works, and take its vent into other Veſſels, as in animal Frames, and extends or contracts Parts, which draw or puſh other Parts, and gives Motion to a Part equal to the Power of the Expanſions, and the Levers, or Pullies, by which it works, and that Force is applied to project a Body, and by it move the Æther, and the Mixture of Air, &c. in it, or the water, or any other Fluid in which it acts; or when a Ball is projected out of a Gun, by the immediate Expanſion of the Fluids, by the Means of Smoke and Corpuſcles, with which it works upon the Motion of the Ball forward, the Corpuſcles it ſucceſſively ſtrikes upon, are moved, partly forward, and partly aſide, in different Angles from the Line it moves in; and with various Angles according to the various Surfaces of the foremoſt Side of the moving Body, and perhaps further in Proportion to the Velocity it moves with. And the Fluid by its Sides is ſucceſſively fuller than the reſt of the Medium, and the Æther, &c. puſhes after it in the Line of Motion, and in all the Angles of a Hemiſphere to the Center of the Ball. The Body would move further than it does, if that impulſe of the Fluid we call Gravity, were taken off; only as far as the force of the Expanſion, exceeded the Reſiſtance of the Fluid, but not infinitely; nor at all without ſuch an Expanſion and ſuch a fluid. When the Body ſtrikes againſt another ſolid Body, it will rebound by motion of this fluid, as aforeſaid.

A body projected by the Elaſticity of another body firſt bended, animal force, or projected immediately by the force of the Animal, is carried in the ſame manner. The String or Hand that moves the Body quickly enough, forms a vacancy behind, and moves a Pillar of Air before; and the Æther and Air which puſh into the vacancy ſucceſſively, purſue the Body, till the motion of the Air be ſo ſlow, that its impulſe downwards alters the Body's courſe; and the recoil of the Æther when ſtopped by a ſolid Body and driven away, according to the angle of Incidence, makes a new vacancy for the Body to move in, and the Æther behind puſhes it in the ſame Manner, as if it were in a ſtreight Line.* By this Means birds and fiſhes are driven forward and borne up; and Sound is alſo carried in the ſame Manner, and perhaps the Truth of this may beſt be proved in Water which can be ſeen, and perhaps the Perception may be helped by Water of different Colours, or by the Motion of Smoke or flame in the Line, the Pillar is moved in before the body approaches to it.

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* It may be tried whether a Marble let fall upon a Piece of Glaſs ſome Diſtance from the Ground, which the Æther can pervade, will riſe as far as if it laid upon a Marble floor, or whether, as far from a Body that hath Holes in it, or &c. this may perhaps be proved with colour'd Waters, and it may be ſhewed by dropping an elaſtick Shell, whoſe Sides will yield much more than the Sides of a Solid, that it is not the Elaſticity of the Body falling, or the Body it falls upon, but in the Æther——Let a Body fall upon a Point as broad as it can touch.

A Pendulum being fixed at the Center, and the Gravity nothing, or ſupported when it hangs Perpendicular, being puſhed out of the Line, riſes till it has Gravity that returns it a little, and the air puſhes after it in Motion, and ſo vibrates it alternately. Whether a light body will vibrate as far, and as faſt, as a heavy body in Vacuo, deſerves Experiment.

A bowl, by rubbing againſt the Ground, is turned round, whether the Æther has any ſuch Effect upon the Globes, I know not.

As for the circular Motion of bodies turning upon a Point, or axis, where the body is ſupported againſt Gravity, and nothing but its friction to be conſider'd in Motion; if its Surface be round, a fluid put into Motion in that Direction will move it for a long Time, and it muſt be impelled by air following it in the ſame Manner.

In groſs fluids, a ſlow Motion of a round bowl, in which it is contained, or of a

Globe in its Center, will make thoſe Parts of the fluids next the Sides move firſt, and that Motion being continu'd, in Time will make it all move round. Qu. What it would do if the Motion were very quick at firſt, or what the Sun's Motion may do. If a round Shell had a Ball in it which ſcarce filled the Space, and were projected here, Gravity would keep the Ball cloſe to the under ſide of the Shell: Would it not turn the contrary way to a Bowl that rubs on the Ground; would not the under-ſide proceed foremoſt.—— How would it go upon a Surface ——How if half filled with Quickſilver.

The Air can take hold as well upon the little Protuberances in the Surface of a round Body, and turn it, as it can take hold of a Fly to Coin with.

A Top turned quickly round, either breaks the Parts of the Air adjoining, and ſo forms a Vacuum, or in turning it puſhes the large Parts forward, leaves the ſmall ones behind, and ſo forms a Vacuum as they call it, and the Groſs which puſhes in, continues the Rotation. In turning a Grindſtone, I think the Water flies backward, or follows not ſo faſt as the Surface of the ſolid Stone, ſo muſt the Atmoſphere.

The force of the body which projects another body, muſt exceed the force of Gravity, of the Reſiſtance of the air, and the pillar of the Æther it ſhifts, in any Direction but downward. The bodies in Motion puſh the larger Maſſes of the Æther which are before them, forward; and they fly forward alſo perhaps faſter. The Motion of the Æther after a body in violent motion makes that Whizz we hear.

Can one throw a bullet out of a cloſe barrel to any diſtance by Projection, or a Bullet more porous than the Barrel? A projected body ſtrikes harder upon a Solid body, than a porous body, becauſe the pillar of Æther reſiſts through the porous body.

Hang ſmall Balls in ſmall Strings in a ſtill Room, ſo as (when a Body is thrown through among them without touching them) to ſee how and in what Order they move.

Bodies fall by the Impulſe firſt, and after, by the Succeſſion of the Air and Æther, into the Vaccuum they leave behind.

Where the Body is ſo thin, porous, or open, that no greater force of the Fluid hits the Parts, than the Reſiſtance of Air, or the Medium, it will not ſink, and ſo in Proportion.

Greater Cubes fall ſwiftlier than leſs, becauſe their Bulks exceed the Proportion of their Surfaces. A Piled Arrow ſhot, or projected upwards with your Pile foremoſt, returns and comes foremoſt downwards.

" Tranſlation of *Nionwentyt*, p. 896. Greater Force and Motion communicated by one Body to another, than the Body had, 917. the Author denies that the force which puts the Body into Motion continues, or goes along with it. When a body ſtrikes againſt two, and gives each a different Direction, it communicates Part of the Vacuum and Impulſe of the groſs Air to each. Will a body jetted in Vacuo by a Spring, move as far as in the Air?"

If two Globes of equal Diameter of different Degrees of Gravity, ſo that one might be ſolid, and the other perforated, were moved in Water, would not that illuſtrate the Æther pervading light Matter? Smoak and Duſt not lighter than Air, but put into Motion, move as a Stone does in the Air, for a ſhort Diſtance.

Bodies in Vacuo.

A Body in Vacuo muſt reſt, becauſe it could have no Tendency any way till ſomething moved it; and when the Mover ceaſed to purſue it, muſt reſt again: But no Accident could happen in Vacuo, to put any body into Motion.

I pretend not to trouble myſelf about a Definition of Space, becauſe I ſuppoſe there never was, nor ever will be a Space that could contain the ſmalleſt Corpuſcle of Matter, without Matter in it.

This Fluid (*viz.* the Air) muſt be infinitely ſubtile where 'tis divided into Unites, pure and unmixt with Vapours, but that, except in ſmall Vacuum's, is out of our Reach. The Corpuſcles of this fluid can be moved by one another at an infinite Diſtance, without any one moving much more than the Length of its own Diameter. Nay, even in Lightning, where pure Fire ſets this fluid into a violent quick Agitation, in one or more Directions, 'tis likely the Corpuſcles are not removed very far. This ſubtle Fluid muſt in its ordinary State be able to divide and ſupport the Maſſes of Air in a Receiver, where the preſſure

PAGE 264. LINE 19.

By Aſtringents or Stypticks, we underſtand ſuch Medicines as are uſed to, and do reſtrain or ſtop any Loſs of Blood, from whatever Cauſe ſuch Hæmorrhage ſhall be produced; but how theſe Medicines act in our Bodies ſo as to produce ſuch a Stoppage, is no where ſatisfactorily explained, and I believe never will without admitting Mr. *Hutchinſon*'s Theory; let us ſee what the beſt authors ſay of them. Dr. *Mead* in his very ingenious Treatiſe, *De Imperio ſolis & Lunæ*, ſays in Caſes of inordinate Fluxes of Blood, we muſt take our Remedies from the Claſs of Medicines, " *quæ dilatatas ultra modum fibras reſtringunt* " *& coercent*," and in the ſame Page, he ſays, as if it were the received Opinion, " *porro cum efficaciſſimæ Liquo*- " *ris arterioſi effervеſcentiam, qua diſtenduntur vaſa, repri*- " *mat & compeſcat Cortex Peruvianus*," And in his laſt moſt accurate Treatiſe on the Small-Pox, in the Bloody Sort, he ſays, if there is any Room for Medicine, " *iis* " *remediis pugnandum eſt, quæ vi ſua Styptica Sanguinem* " *quodam modo cogunt, & ita ſupprimunt, ut ne minimas qui*- " *dam Arterias perrumpat*." The Way to theſe *Minimæ Arteriæ*, muſt be by the common Road of the Circulation; but if the leaſt *Coagulum* in the Blood, or Tendency to it ſhould happen before it paſſes the Lungs, theſe would be obſtructed fatally, ſo that it is impoſſible the ſtyptical Virtue of any Medicine, can paſs, really, as ſuch, into the Blood; becauſe by this very Virtue itſelf, it is evident, it muſt ſtop its own Paſſage long before it reaches the Veſſel upon which it is ſuppoſed to operate. Much leſs will they ever be ſhewn immediately to criſp or conſtringe the Veſſels, ſo as to make them keep in theſe Humours, which by too great a Dilatation, they are thought to let out. *Boerhaave*, ſeems to be aware of the Conſequence of this Doctrine, (tho' he teaches it himſelf) and gives a Caution as to uſing this Sort of Medicine. In Paragraph 1107. of his *Pathology*, he recites this Claſs of Medicines; in 1108, he tells you when they are of Uſe, and 1109, he tells you, to be very cautious in adminiſtring them, " *ex conſideratione certi experimenti quo ſcimus* " *auſtera in primas vias, nimis, in interiores difficulter* " *agere*;" he had ſaid the Truth, had he confined their

Action only to the *Primæ Viæ*, further than which their own Nature will not allow them to go, and when there, known Operation will unriddle their whole Power, and leave us no longer in the Dark about them, *viz.* they check the Steam, *i, e.* in our Stomach and Guts (they act, as is known this whole Claſs does in Fermentation) they ſuſpend or greatly leſſen the Animal Proceſs, ſo little or no Steam is generated during their Action, or by being in Contact with the Lacteals, may conſtringe them, ſo as to let no Steam go off, perhaps both theſe Effects may be produced; and if thus the Agent be ſuſpended *ab officio*, by the Bark, for inſtance, then *Efferveſcentia Liquoris Arterioſi efficaciſſime compeſcetur*. And as a further Evidence of their Operation being confined to the *Primæ Viæ*, it is known their Virtue ceaſes upon the leaſt Purging, whether it happen then naturally, or be unſkillfully procured.

N. B. This *Note* coming too late to the Preſs, the *Binder* muſt obſerve to place it between Page 264, and 265.

Preſſure of the outward Air is taken off, and this Fluid can be preſſed in, for otherwiſe let the Maſſes or Air be of what Figure you can imagine, and have as much Elaſticity to extend themſelves as they dream of, they could never be all pumped out of a Receiver. If you tyed a Bladder full of Water to a Pipe, in a Receiver, with a glaſs Top, tyed the Neck of the Bladder, pumped out the Air, and then opened the Neck of the Bladder, and preſſed the Water, and kept the Bladder compreſſed, the Vacancy would ſhew what air was left in the Receiver. As to demonſtrate the Reaſon; the Air moves, they ſay towards a Vacuum or thinner fluid, that cannot be, it is not the lighter fluid but the Corpuſcles of it (air) are more capable of being taken hold of, and driven by the Expanſion than thoſe of a thinner fluid, and conſequently thoſe of the light or thin Æther move contrary ways to ſupply the Place of thoſe of the Air. Theſe are the two contrary Motions Sir *I. N.* aims at. And this is that which drives fire, or is fire.

The Compreſſure of the Æther [Light] and Air [Spirit] upon any Point of the Surface of a Veſſel void of air can be eaſily aſcertained; and if the Æther or Space in that Veſſel can be rarified, ſo that there will be a greater Force upon the Surface, than there is a force in ſomething elſe beſide the air [Spirit] for rarifying the ſmall Quantity of air remaining within, and thereby producing or increaſing its Elaſticity, cannot be performed but by a force ſuperior to the Air, and that Æther which remained unrarify'd within, ſupported the Preſſure of the Æther which pervaded. One may meaſure the Decreaſe of the Reſiſtance, as the Vacuum goes thinner by forcing in a Sucker thro' a Tube into the Veſſel. The difference of the Reſiſtance in different Degrees of Vacuums, may be proved by the different Sizes of Drops of Water, which will, when dropped upon the inner Surface of the Tops of Veſſels, before the air is extracted, at different Degrees fall from thence.

By turning a Receiver upſide down, if the Contrivance were on the upper ſide to meaſure the Compreſſure, it will then prove the Compreſſure on the under ſide, and ſo on any ſide, and ſhew what the Force of Gravity exceeds the Lateral, or bottom Preſſure. If the Parts in Vacuo ſtand long in the Cold, will there be new air in it?

When ſmall Parts which only can pervade the Pores of a Receiver, are there, none but as ſmall can come in to compreſs them to unite, and that they cannot do, I think. Qu. What in Time. Small Maſſes cannot adhere, till they come among Maſſes which can preſs upon two or more of them at once; ſo water makes Bodies ſolid, which air will not, *&c.* in Degrees.

Compare the vaſt Vacuum next each Globe, with the ſmall Vacuums and their Operations.

In vacuo the Parts are ſo ſmall, and ſo nearly of a ſize, that ſmall or no Motion is produced.

The parts left in a Glaſs, when the groſſer are extracted, moved by the rubbing of your Hand produce light in the dark; try this with Motion ſet near a burning Light, or, *&c.*

Bodies of equal Weight in the Air, weigh differently in water. Qu. If differently in Vacuo. Try very thin empty Bladders, and let them ſwell, and ſee how they will fall in Vacuo: Whether any Contrivance could be made by Friction of the Air, in Vacuo, between two Solids to make the parts ſmaller to the Degree of fire, (but the pores of the Caſe would admit others.) by rolling a Ball in a Concave poliſhed.

The ſmall parts of fire which drive up the parts of Water make Vacuums in the Intervals between the parts of the Water; precipitate the parts of Water by an addition of cold Water, or make them unite ſo large, that the ſmall parts of Æther in Motion cannot ſupport them, and you have a Vacuum.

The ſparks which fly from Iron when it begins to burn, from burning Charcoal, &c. are driven by Matter preſſing into Vacuums behind them.

As the action from the Sun to us, or the Expanſion againſt the part of the Surface is more or leſs interrupted by Clouds, groſs Maſſes of air, or, &c. at diſtance, the Barometer ſhould riſe or fall: but perhaps the Size of the maſſes near the Surface, in the different Seaſons of hot or cold, may work differently upon the Surface of the Mercury, when all is clear above. When the parts of the Æther in air here are divided very ſmall, they pervade the pores of the Tube above the Mercury, thin that which was there and make it liable to pervade. When by Humidity, or &c. in the air, the parts within the Glaſs are ſtorkened into Maſſes, that cannot get out, and ſo that ſome of the few ſmall parts out of the air enter and expand them; and the air without is leſs expanded or agitated, it preſſes leſs. It might be tried whether ſmall Æther ſtorkened in a glaſs with Cold and Wet, would admit any other fluid to be preſſed in by force.

So two Cauſes make the Glaſs riſe, one when the preſſure of the Firmament is great by the action of the Sun; and the other when the Maſſes of the air are large, and the firmament preſſes hard with them. And when there are not ſmall parts enough divided and intermixed among the Atmoſphere to pervade, and attempt to expand the groſs fluids, they freeze. But Spirits whoſe parts are ſmall, never freeze with that Defect here.

Small porous bodies ſuch as Straws, &c. are driven into a Vacuum, formed near the Surface of rubbed Amber, &c. as the groſs parts of Æther are: and the ſmall Parts, whoſe place they take, can recede through the Pores, as they do between the maſſes of Spirit.

When you make a Vacuum, and a Sort of Ferment or Action, on the Surface of Amber, &c. as the Air puſhes in, or perhaps more when it abates, the Air will puſh a light Body to its Surface, and keep it there.: If it be heated through, the ſmall Æther puſhes through and drives it to.

A Bubble of divided Parts of Air, with a Shell of Water or vegetable Matter about it, may be lighter than ſo much Air undivided.

Qu. How Metal ſet in melted would harden; how Wax melted, or Lime and Sand would ſet in Vacuo.

Will ſpring Water incloſed in Vacuo freeze, or does the air in a little Time infuſe fibres to make it freeze. If air were extracted out of the Tube between the two Glaſſes of a Teleſcope, we ſhould ſee better I think.

Solution of Vitriol, and Decoction of Gall in Vacuo, ſhew no Change of Colour.

Fluidity.

IN the common Degree of Agitation Light has upon the Globe, nearly under the Equator, it keeps all other Fluids fluid: The air [Spirit] and Vapours can ſwim in it, be impulſed, divided or ſhifted by it. And as its Agitation on the Side turned from the Sun, or towards each Pole is leſſen'd, the Fluidity of this and other Fluids is leſſen'd. When it is ſtrongly agitated it can remove the Vapours, and divide the Air. When it is weakly agitated, the Air can remove a conſiderable Part of it, which is one Cauſe of the horizontal Motion of the Wind and Clouds near the Equator. Where the Expanſion of the Fluid is nearly equal, and the Expulſion of the air and Vapours is nearly periodical, the falls of Rain and Motion of the Wind will be more certain. Proof may be made of the Expulſion of Air by this ferment, by cloſing Receivers in different Degrees of it, and forcing Water into them; nay, Heat injected thro' the Sides of a Veſſel in Quantity, wholly expels the air: If it be hotter on one ſide of the Houſe than on the other, and there be an Entry or Paſſage thro' the Houſe, as ſoon as the Heat abates by a Cloud, or *&c.* the air will puſh thro' that Paſſage. The ſide of the Atmoſphere next the Sun, and likewiſe the Fluids in it are alternately or progreſſively fermented; and as it and they are turned from the Sun, condenſed. This fluid put into fermentation, puts all the Liquors upon the ſurface which will ferment into Fermentation, and even thoſe in Veſſels lodged in Cellars or Vaults, to a conſiderable Depth. But when it is ſo deep, that agitation in this fluid doth not reach it, or that it is clogged or obſtructed, or in that Condition we call Cold or froſt, the fluids will not ferment unleſs aſſiſted by fire, which points out the Agent. And as nothing is wanting to form a ſolid but Corpuſcles which touch with their Surfaces, or in the main come ſo near together, that no agent paſs between, or by outward Force divide them, this fluid at reſt or ont moved, filling the Interſtices of other fluids, makes them ſolids, or frozen till it be put into Motion, and then it will burſt a Veſſel, Stone, or *&c.* which was filled with it. The fermenting force weakens as the Diſtance from the Sun, fire, or *&c.* increaſes, or in proportion to the Interruptions it meets with, and conſequently its expulſive force in the ſame proportion. Its fermentive force among the fluids in the abyſs, or at great Depths, is only viſible by Vapours which aſcend out of the Globe. The *Æther* which enters, pervades and puſhes thro' the Earth to oppoſite Sides, tho' perhaps not ſo directly, as if it where empty Space, or filled with nothing but *Æther* or Atmoſphere. And the Intervals, as well between the ſolid as fluid Corpuſcles, thro' the whole Maſs, is conſtantly filled with it; and the Preſſure of the Atmoſphere would not make the Juices ariſe in Vegetables, for that is often as great in Winter, as in Summer, but the Agitation of the thin Fluid, by the Motion it receives from the Sun, quite thro', but chiefly on the Surface of the Earth, gives each Particle a greater Force, by being driven through the Pores of the Earth, Stone, &c. and makes them riſe and bear up the Corpuſcles of Water, vegetable Matter, &c. with them. Its Operations in dividing the Corpuſcles of Water near the Surface of the Ground, uniting with them, and bearing them up; and of dividing and detaching them from the Surfaces of the Waters are viſible. The Steams which aſcend out of the Earth, may be ſent up into the Fluids of Air, &c. in the Atmoſphere, by an impulſe below; but when that Impulſe is ſpent, if they be heavier than the Air, &c. they ſubſide; if equal, hover; if lighter than the Air near the Earth, riſe into that Part of the Air which is equal to their Gravity, and with Velocity in proportion to the Difference of their comparative Levity, and hover there, or move as the Air is moved, till for want of the Fermentation by the into Fermentation, and ev- [illegible] them by ſels lodged in Cell- [illegible] or by Addition of ſiderable De- [illegible] or Steam which will that agita- [illegible] and make them heavier it, or th [illegible] with them, and they fall to the Ground. in tha [illegible] when the Air, &c. is borne up into our At- the [illegible] And any Steam by the Impulſe from below, by moſphere, or the Rebounds or Reflection of this as or the Fluid impulſed from the Sun, the Parts or Maſſes of this Fluid, and of the Atmoſphere, which have more Gravity, puſh downward; and the Corpuſcles of this Fluid entangled with thoſe of Water, till they are lighter than Air, and the reſt of the Mixture among the Fluids in the Atmoſphere, where all is full, muſt riſe higheſt.

Boyles Philoſo. Eſſays.

" A Body ſeems to be Fluid chiefly upon this Account, that it conſiſts of Corpuſcles, that touching one another in ſome Parts only of their Surfaces (and ſo being incontinguous in the reſt) and ſeparately agitated to and fro, can by Reaſon of the numerous Pores or Spaces neceſſarily left betwixt their incontiguous Parts, eaſily glide along each others ſuperficies; and by Reaſon of their motion, diffuſe themſelves till they meet with ſome hard or reſiſting Body, to whoſe internal Surface, by virtue of hat motion, their ſmallneſs, and either r Gravity, or ſomething Analogous, or quivalent to it, they exquiſitely as to Senſe, accomodate themſelves."

"The ſame Cauſe, whatever it be that gives the Air its wonted Agitation, is able to give ſuch minute Corpuſcles enough of it to keep them fluid." He ſeems to aſcribe fluidneſs to heat and motion, for we ſee that Water when it is deprived of them becomes ſolid.

Corpuſcles of ſome Sorts of Fluids will mix with, or paſs between the Corpuſcles of ſome others, and the whole remain a fluid. And the Corpuſcles of ſome Bodies are ſo far diſtant from each other, or the Maſſes compoſed of them are ſo far diſtant that ſome fluids can paſs between them.

The Corpuſcles of ſeveral Sorts keep fluid, ſome with one Degree, ſome with another of the Sun's Action; here any Sort will keep fluid with the action of the Sun directed to a point by art.

And 'tis likely the Corpuſcles are of ſeveral ſizes, which require ſeveral degrees to keep them fluid: and that thoſe which were intended to remain united or ſolid, are of ſizes too large to be moved, but are ſucceſſively driven backward into the Vacuum by the natural action of the Sun here; and perhaps ſome of the Corpuſcles can only unite or form Maſſes to one ſize; other ſorts to other ſizes; and ſome to any ſize. And each ſort have a different Degree of Tenacity, or Solidity, according to the degree of action the ſun, fire, or, &c. has, where they each are.

There are ſeveral Degrees, and I think I may ſay, ſeveral ſorts of fluidity; Things which are melted are fluid; Things which rope or ſtick part to part, or to the parts of ſolids, are ſaid to be fluid. Water, Spirits, &c. which ſtick in ſmall Degrees to their own, or parts of ſolids only in Drops, or ſmall Maſſes, are called humid fluids; and this ſmall Degree of adheſion makes them capable of being projected, or falling in ſtreams or drops.

Mercury is called a Fluid, but is dry, has ſo ſmall a degree of adheſion to its own, or the Parts of other dry Bodies, (Gold excepted) that it will run in a ſtream; projected, will fly in balls; raiſed out of Fire in form of Vapour, I think adheres to dry Solids, as Salt, &c. But the Parts of Air in Unites, are called dry, becauſe they have the leaſt Degree of Adheſion to its own, or the Parts of others; can only here adhere into ſmall Maſſes, and they, or ſome of them paſs between one another, and between the Parts of all other Bodies or Fluids, without any perceptible adheſion.

Elaſticity.

ELASTICITY, as they account, muſt be a Power in every Corpuſcle, to return to its original Figure; but is only to reſiſt being bended or compreſſed. This is increaſed by the Corpuſcles being forced nearer together in hot Metal, by being freed from Clay, and extraneous Matter, by being quenched in Water to a certain Degree of cloſeneſs, or by the Strokes of a Hammer. In ſome Sorts of open green Wood, by having its Pores filled with Juices. In ſome Sorts, which will contract, by drying. In Fibres of Plants, by being twiſted, or their Pores filled with Water when twiſted.

The Elaſticity in Matter cannot produce any Motion, there muſt firſt be Motion given to ſome agent to divert the Body that is Elaſtick, out of its common Figure, and a Relaxation of that force and motion to ſuffer the Body to return to its natural figure and poſition, and puſh the oppoſite Way, as far as it was put out of its Lines.

Expanſion accounts for Elaſticity, for if any force remove one Part of a Corpuſcle further off the next in one Point than another, that agent puſhes it to again, and makes their ſurfaces, which made an angle, approach to each other, and become parellel. This is varied as Gravity is, by raiſing of Vapours, and is greater or leſs: Setle how that is performed by the Expanſion and Compreſſure in the fluid, and how it was at the flood.

The Corpuſcles muſt be Plates or Threads, and framed to touch in part, and be off in part. Thoſe ſo figured and ſolideſt, attract as they term it, ſtronglieſt; and the cloſer, as in fire, and hardened Iron, ſtill ſtronger.

Elaſticity muſt ſubſiſt in the fluid, by the ſame means it does in ſolids; after the firſt force hath puſhed the Corpuſcles from each other at one End, the reſt muſt puſh them together, and give the Spring.

If that Power of whatever agent it is that cauſes Elaſticity, were a Law only, or immaterial, would it be liable to the Effects of Heat and Cold, moiſt, dry, &c. If matter heighten or ſlacken that Power, why may not matter be the agent?

Elaſticity ſeems to ſhew that a Solid, whoſe Parts are more preſſed in on one

Part than another, ſtrive to recover an Equality, as ſome fluids do. This acts only in Bodies of particular Textures, or in ſome Bodies in different Degrees, in proportion as they are made harder by art, or that the Parts come ſo near one to another, that they, when they are preſſed beyond their natural bent, extend themſelves towards their priſtine figure. Several Circumſtances occur in proportion to the ſorts of Corpuſcles. When a Body is bent, if it be all of the ſame conſiſtency, it turns upon a Point at one Side, and opens an angle from that Point. If it be ſo thick that the Corpuſcles on the convex Side be opened beyond ſuch a Degree, it cracks or breaks. If it were half as thick, they would but open half as wide at the ſame bent, and not break till bent twice as far. When Veſſels of animal Bodies are ſtretched, and the ſmall ones emptied, they have little or no contractive force.

The preſſure of the Æther upon the Corpuſcles of an Elaſtick Body, beyond the Reſiſtance it meets by the oppoſite Pillar, is equal to the Preſſure upon the Body, whoſe Weight bends the Spring, abating the Reſiſtance alſo of the oppoſite

Pillar. And the Preſſure cannot be upon the whole Breadth of the Corpuſcles, becauſe it muſt be ſuppoſed that Part of each Corpuſcle touches.

Could no Experiment be made with a Spring, in ſuch a Vacuum as Gun-Powder makes, or what it does in froſt? I think a Spring encloſed in Ice, and bent, will break. It muſt undergo the ſame alteration as the Æther doth.

If a Body be bent till the Unites on one Side make Intervals to admit Maſſes of air, as large as thoſe about the Body, I think it will ſtand bent.

All Parts of Bodies that bend are far ſo fluid. Elaſtick Bodies act as Fluids do; preſſed in one Part, fly to another leſs preſſed, and ſtrike over by the Motion of the [Spirit] when ſet forward by quick Motion; do not, when they return ſlowly.

Compariſons of Gravity or the Difference of Preſſure in the Air, on different Things, and in each of their different Poſitions.

FERMENTATION by the Sun, and Fermentation in the Atmoſphere of each ſeveral Orb, is only what concerns each Globe, and that Fermentation is in a Line from the Sun upon half the Atmoſphere, and ſhifts as the Globe and its Atmoſphere turns; and when interrupted by Clouds, *&c.* is ſoon carried on that Depth, after they remove; becauſe there is ſtill a Tendency forward by the ſucceſſive Corpuſcles from each Side of the Sun; for if the firſt Corpuſcle move but an Inch, that will ſtrike others, and they, ſtill ſucceſſively, others, and the Ferment perpetually expand, drive forward the Corpuſcles till there be an Interruption. And, I think, at that Diſtance from the Globes, beyond the Reach of each of their Atmoſpheres, this Fluid on the Side next the Sun, is in Form of Fire; and the Expanſion on the dark Sides, as well as on the light Sides, is the Cauſe of Gravity and all Motion. The Preſſure of the Atmoſphere, or Gravity, may be as great when it is cold as hot.

Heat is increaſed by the Sun's approaching the Zenith, Clearneſs of the Atmoſphere, Length of Duration of the Sun's Motion upon the ſame Part. Gravity may be abated by the Interpoſition of groſs Vapours, but more likely by Interruptions by the Motions of the Fluids out of the Globe.

Our Proofs of Gravity upon Mercury in Glaſſes, perhaps is only with reſpect to the Proportion of Air this Fluid acts with. As it pervades all, its Gravity may be equal, or greater, or leſs, and its Operations on each Part not in proportion; and its Motion or Agitation, which riſes or ſinks Spirits in Glaſſes, perhaps may be great when the Gravity is not ſo, becauſe it may proceed from below, *&c.* when the Force from below increaſes and prevails, the outward preſſure of the atmoſphere is comparatively leſſened, the Steams and Stinks aſcend more in proportion.

Spirit, his inviſible powerful agent. This Operation is continually upon every Unite of Matter.

Firmament, Fire with air unites, fire without air diſſipates Matter---doth not ſuffer Reſiſtance from any thing in the great Spaces, but from its own Corpuſcles, and they glide by and pervade through others; and if any Space were nearly full of Mercury, and no Æther, every Pillar whereof can reſt upon the moſt minute of its Corpuſcles, and thereby make it keep cloſe together, if diſtant from other Matter; if near the Earth to gravitate, a Body would move freely in it.

Qu. If the ſeveral Globes be not placed in the different Degrees of Solidity of the Firmament, from which they cannot paſs like Nodules at different Depths in the Water. In Rotation of a Solid with Fluids upon it, whoſe Parts are leſs than the Parts of the Solid, and when the Fluid about it is equal on each Side, the ſolid goes faſter, and the fluid attempts to recede, or lag behind; ſo would the atmoſphere attempt to do, but is kept up by the Puſh of the Æther.

I think I may ſay, the Unites, or Parts of any Body which are larger than thoſe of the fluid of air they are in, weigh in ſome proportion to the Difference. And thoſe which are ſmaller weigh nothing, and ſubſtract from or diminiſh the Weight of thoſe they are joined, or ſwim with, which are larger. But whether there be any vegetable Matter, whoſe Parts are ſmaller than the maſſes of air, has not yet been fully proved; though theſe, divided by fire, riſe in ſmoak, being put into Motion, but when that Motion is ſpent; whether they fall, or riſe to the Clouds, I am not certain.

The parts of fluids, or ſolids in fluids, when extreamly ſmall, in Maſſes ſink, or move in proportion to their Dimenſions, with allowance in each ſort for the Difference of the Magnitude of the Unites.

Unites, or Maſſes, of the ſame Size in the fluid of Æther, weigh nothing; ſmaller among them leſs than nothing or recede. The larger are heavier, or move forward, or downward, in proportion to their Size.

If the corpuſcles of air that impell Bodies were not ſo ſmall, that they could pervade the Pores of all Bodies, except Load-Stone and Iron, they would break down Buildings, *&c.*

There are reaſons for creating the atoms looſe, it was to ſhew, that by the ſizes, figures, and proportions of thoſe atoms or unites, the actions of the ſpirit did, and always will, fix ſome, ſeparate others, move the fixed bodies, ſhift the looſe Parts, divide and unite them alternately, ſo as to ſupport each Part of the Syſtem inanimate and animate. It was proper that this agent, which was to keep all in order, ſhould, by its Operations, form all Things, either by itſelf, or with Water, *&c.* in ſuch manner as it might, by continuing its action upon them, keep them in that Oeconomy, as will appear, as Water formed its own Channel.

As ſoon as the motion of the ſmall Æther, in its retreat from the fire upwards, or in the Direction it is confined, exceeds the Difference of the Preſſure, the ſmalleſt Unites recede upwards; as its Velocity is increaſed, it bears up larger; as more, ſtill larger. Which is a plain Proof that Difference in Gravity lies in the Unites. The Proof of the Gravity of the Unites is beſt ſhewed in the bodies of Glaſs formed from the different Sizes of Unites; where each Sort are melted and formed, almoſt as cloſe as if they were applied Unite by Unite. Mr. *Dawſon* ſays Chalk is difficult to melt, and will not be fine. But *Qu.*

Is it not plain Evidence, that this Agent acts upon Unites in proportion to their Difference of Size, and that it is Æther, becauſe a certain Degree will detach a ſmall Number of the Unites of Spirits out of a vaſt mixture; and a little more will take thoſe of oyl, and a little more thoſe of water, and ſtill more thoſe of mercury; ſome vegetable matter will riſe into Plants out of the air, ſome out of Water, any with the Water, both out of the Earth.

Whether the fineſt fibrous matter, ſuch as Silk, or Cotton, &c. can be beat ſo ſmall till it will weigh leſs than it will do when twined and made more ſolid, I am not certain. Or whether the Parts of Water, Spirits, &c. put into Motion, and raiſed into Steam, confined in a Veſſel, will weigh leſs, than when condenſed, I am not certain. A Pint of Spirits weighs leſs than a Pint of Water; and Water freſh, leſs than that with Parts of Salt in it; that leſs than other Fluids, even to Quickſilver. It is becauſe the Æther preſſes freelier thro', or becauſe there is a greater Mixture of Æther in one than another, and ſo that which contains leaſt Æther weighs moſt? Or is it only, that the ſame Space, filled with the groſſeſt Unites, weighs the moſt, and that the Union or Diviſion of thoſe Unites, makes no Difference? Either there are Unites in the Æther of different Sizes, or elſe the groſſeſt Maſſes are puſhed moſt. But perhaps this holds only as to itſelf, and that the Unites, or ſmall Parts of the Æther, paſs as freely through between the Unites, in the Maſſes of all other Sorts of Unites, as if they remained looſe in Unites.

There muſt be Compariſons of Size, Gravity, Adheſion, Separation, Fluidity, Volatility by Air, Fermentation, Fire, &c.

at the End of each Claſs of Things peculiar to that Claſs, and what concerns them with relation to others, with proper Queries, &c. firſt general to the Species, after particular, in Order as they ſtand,

I. Unites of ſeveral Sizes, ſeparate, are each acted upon in ſome proportion to their reſpective Size, with an Allowance of ſome Difference in their Figures.

II. Maſſes, compoſed of Unites of the ſame Size, are differently acted upon in ſome proportion to the Number of Unites contained in each.

III. Maſſes, each of the ſame Size, and each Maſs compoſed of Unites of the ſame Size, but the Unites of each differing in Size, form thoſe which compoſe each other, are differently acted upon in ſome proportion to the Size of the Unites which compoſe each.

IV. Maſſes of different Sizes, each compoſed of Unites of the ſame Size, but differing in Size from thoſe which compoſe each other, are differently acted upon in ſome proportion to the Size of the Unites which compoſe each, and the Size of the Maſſes. So in Mixtures, where the Unites which compoſe a Maſs are of different Sizes. And whether the Unites be fluid or looſe, in Ice or Water, in Maſs or Powder,

der, or adhere cloſely or looſely, ſo they be kept together, or incloſed in ſomething which keeps them together, they weigh the ſame; but are moved with greater Velocity, the cloſer they are kept together in the Air.

That Preſſure they call Gravity, muſt be greateſt upon a Body of any Size; ſuppoſe an Inch Cubick, if it were one ſolid, would reſiſt moſt ſo. The largeſt Unites, which compoſe a Body of a Cubick Inch adhering, will be the heavieſt or reſiſt moſt, becauſe they will interrupt the Pervaſion of the Æther moſt. And the more there are of them united, the Interruption will be the greater.

Will melting Matter into Glaſs, or nealing Metal make it lighter, or hammering or hardning, make it heavier? The Difference between the Force of Compreſſure, and that Difference of upper and under Preſſure, they call Gravity, is ſo great, that the Unites in a ſlender Wire adhere ſo ſtrongly, that they will ſupport a vaſt Maſs, in which we call the Difference of a Ton Weight. As the Thickneſs of a Maſs ſeems to diminiſh the Power of preſſing on one Side, it doth the ſame on the other, ſo the Difference will ſtill be the ſame.

The Preſſure of the Pillars of Æther, as I deſcribe them, is moſt evidently ſhewn in the Figure of the Globes of Quickſilver, which 'tis likely they pervade leaſt.

Preſſure is altered at particular Times and Places by Heat, &c. which is produced by the ſun's action. So may groſs Parts in the atmoſphere, *&c.* alter it. The more groſs the atmoſphere is, the more the Strokes of the fluid will be kept off and gravitate the leſs.

It ſhould be well conſidered how Elaſticity will drive the atmoſphere, or groſſeſt parts near each Globe by the Difference of the Length of the Pillars. And how it is, Whether thinner at equal Diſtance from one Globe, and how between two Globes. Conſider, that if the ſmall Parts have Paſſage through a Ball of Glaſs forward, the Parts before muſt recede by the Sides of the Ball, to ſupply the Defect behind. They muſt divide at the Focus, and thoſe which fly out ſideways are changed for larger. Conſider what this can do, if there be any Paſſage through a Load-Stone, the Earth, or *&c.*

They ſay Sir *I.* pretends there are two Powers, the one gravity, or ponderating, the other attraction or drawing; but that gravity is much more powerful than attraction. But that, as they ſay, as one Body puſhes againſt another of equal quantity of matter, the other puſhes as much againſt it.

Centripetal and centrifugal Motion, is only performed by the Difference in magnitude of ſmall Corpuſcles, whereby the heavier or larger ſink, and the lighter riſe. If the groſſer move downward, the Force will be the greater that way. If they move upward, the Force will be the greater that way.

Here are your centripetal and centrifugal Impulſes. It is plain now, that upon the Surface of the Earth above the Level of the Sea, attraction bears a conſiderable proportion to the power of gravity, becauſe Clay, *&c.* cracks, and draws in the Lines of the Shell, with almoſt as much Force as it ſinks by Gravity; and becauſe of the great Diſtance of the inner Globe, it doth not effect Things here ſo much as Sides of the Shell, ſo the ſaid Sides keep Corpuſcles which are looſe (and let groſs air come between) from coming together and adhering.

When a Solid, or Body, whoſe Pores are full of Æther, preſſed upon in every Unite by the Æther, which is without on its different Sides, ſuppoſe the upper and under Side, with that Force, which is inconceivable (but in reſpect to the Side, with that Difference we call the Gravity of the Body, but occaſioned by the Interruption of the Æther on one Side) is removed to a Place where the Preſſure on either Side is increaſed or diminiſhed, and where the Æther can in any conſiderable Degree paſs through the Pores of the Solid; but let the Preſſure upon each Side be what it happens to be, the Æther will either move through in its Courſe of Motion, or if there be no direct Motion of the Æther, it will iſſue out at the Side leaſt preſſed, if the Æther be of equal Thickneſs: But if the Pillars be of equal Length, and the Æther in one thinner than in the other, on the Side where the Æther is thinner.

Exploſions by Air, &c.

RAREFACTION is made by expanding ſome Fluid, by driving the Corpuſcles of Fire into them, or putting thoſe that are there into Motion, whereby the Corpuſcles of Air, Water, or other Vapours are driven out.

Forcing Bodies to ſhift, as by firing the Powder in a great Gun, all the Air for Miles round, (to what Height, *Qy.*) Shifts no Parts far from their Place, except near to the Gun, and ſo in proportion to their Diſtances, every thing takes its Place again in a moment, or in two or three Vibrations, which they call Ecchoes. And their Action doth not need any Vacuum to move the Parts in, becauſe as the great maſſes move one way, the ſmall ones move another, and the Action is no more than each ſliding upon, or by another, or others; ſo that if the large go Eaſt, the ſmall go Weſt; and ſo in Order; and as the Action ceaſes, all goes to an Equilibrium. But the reſpective motion of each Unite of each diſtinct ſort in each fluid, and of the maſſes in each ſort, and of each ſize of each ſort, of their ſtriking againſt each other, againſt the Ground, or other ſolids; their motion which they communicate, and their rebounds, ought to be ſet in a clear Light; always conſidering the line or train of atoms or maſſes, which ſucceed and puſh each other cloſe in a Line or Lines; and the Difference between the Velocity and Direction of thoſe which are in the center, or chief Point of motion, and thoſe which proceed in oblique Lines from each Side; and this, as well of the large as of the ſmall; and that the largeſt of the large go firſt forward, and the ſmalleſt of the ſmall recede firſt, and ſo in Order till they come to an Equilibrium.

'Tis evident Light put into violent Motion can expel Spirit, Water, or any other Fluid, and form a Vacuum, or Space only filled by itſelf; and this either confined by Solids, or in the open Air.

'Tis hard to conceive, more to deſcribe, how a Corpuſcle, by puſhing in between two others, and by dividing them, or ſplitting a Maſs, or expanding ſome Parts like Bladders, forms ſome Sort of a Vacuum, and others of the Æther puſh in and fill the Vacuity; and thereby, if the Fluid be confined by Solids, expands the Maſs, and, if any other Fluid, expels that Fluid each Way; and ſo each Corpuſcle acting, or being acted upon, and others ſtill ſucceeding, during the Agitation, a Space void of all other Fluids is formed; or if there be any other Mixture of other Fluids in that Vacuum, expanding them by Interpoſition vaſtly.

When Fluids contained in a ſolid Veſſel, are expanded into Steam by Heat pervading the Sides, it may be increaſed or diminiſhed, and continued as long as the Action continues, or till the Veſſel burſt. And the Æther in the Atmoſphere, heated by the Sun, ſo long as that Action endures, or the Action of Fire in Fuel, may keep up ſuch an Expanſion; but the Exploſion of Water, or Air put into Fire, or heated Bodies, or melted Metal, or by Fire put into Gunpowder, are made by expanding them in an Inſtant, condenſed as ſoon as made, and the circumambient Air in the ſame Inſtant, which is filled fuller on all Sides, is preſſed back into the Sphere, or half Sphere, or other Figure, where the Exploſion and Vacancy was made. This Exploſion being greater in any Line of Direction, eſpecially upwards, than the Preſſure of Gravity, throws aſide Solids, in every Direction, which oppoſe it, whether they be looſe or ſolid: When confined or oppoſed, takes its Courſe and vents itſelf that Way, where it meets with leaſt Oppoſition. And if the Reſiſtance in that Part be much leſs, and Paſſage ſufficient, ſpends little of its Force in other Directions.

The Corpuſcles of this Æther put into Motion by the Sun, and collected into a Focus, or a few Corpuſcles of the Æther put into Motion in a ſmall Maſs of Matter, which we call a Spark, having formed a Vacuum, being placed very near Gunpowder, and being puſhed by the circumjacent Air, and Æther on each Side of the Vacuum, except on that Side next the Gunpowder, is driven againſt the volatile Salts in the Mixture, makes them ſplit the Corpuſcies puſcles of Charcoal and Oyl, and other Salts, and act jointly with the Æther. Splitting the Corpuſcles makes them take up more Space, as Vacancies are formed Æther puſhes in into them; where they are reſiſted they force there, when greater than the circumambient Air, or Air oppoſing in a Barrel, they puſh that Way they meet with leaſt Reſiſtance. The Æther puſhes in after them when they move, and when they are out of the Barrel expands them into blue Flame in the Center, moves the Smoke out like an Atmoſphere, and forms a Vacuum of Air in Form of the Flame of a Candle.

The Force of a Puſh made by the Exploſion of Gunpowder, is outward from the Center on each Side, in proportion to the Length of the Semidiameter of the Vacancy made from the Center, when it is not confined, but fired in open Air, in any Degree of the preſſure of the air, and the Vacancy it then makes, I think is in the the form of the flame of a candle, or a little approaching that form. How far it moves the circumjacent air, by forcing in the exploded air, and by its atmoſphere of Smoke, is hard to conceive; and, I think, when the action is ſpent, and the Smoke condenſes, the air puſhes back into the Vacancy, and by reaſon of the Prevalency upwards, the Æther and Smoke, or expanded Fluid of Water, or, *&c.* it acts with, is driven up in a Pillar or Column like a Spire, whoſe Diameter is proportionable to the ſaid Diameter of the Vacancy; and whoſe Length perhaps is extended till the Space it takes would fill the firſt Vacancy, and thereby partly drives up, and partly puſhes aſide the air it meets with in its Paſſage, and perhaps not only the air from the baſe, but the air puſhed aſide all along, drives in after it, and furthers the Motion.

It ſeems as if air preſſed in amongſt gunpowder fired, makes the fire and ſmoke, which is lighter than air, puſh off ſo quickly, and ſtrongly.

In an Exploſion by Gunpowder fired, or water expanded by fire, or in, *&c*, every atom, in whatever Direction it moves, is driven by the oppoſite Pillar of Æther. Why each moves in the Direction it takes, why one Pillar on one Side, and the other on the other keeps it not ſtill, is the Thing to be explained. Whether the Æther and Air, preſſing the fire into the Powder on every Side, diſſolves the Parts till they are lighter than air or ſmoke, and ſo fly outward on every Side, and more upward rather than any other Way, and each being once ſo put into Motion, the Æther by its being preſſed, puſhes after them, and gives each its Force in each Direction: and whether the Vapours in the Earth are not raiſed in this Manner out into the Strata, and up into the Air; *Qu.*

One would think the Sound upon firing a Gun, came from the Rebound upon the Return of the Air into the Vacuum, becauſe it comes ſo long after the Fire. But then, why is there no Sound when Powder is fired looſe, unleſs it be becauſe there is nothing ſolid to rebound from, till at that Diſtance, that its Force is ſpent. Whether the divided Æther which paſſes the Pores of the Barrel, widen them, and is jirk'd out by their being puſhed together again deſerves to be conſider'd.

When Powder confined in a Barrel, whoſe Reſiſtance on every Side is equal to the Expanſion, is fir'd, the Smoke and Vapour expel the Air, and is continued the Length of the Barrel in that Line; as ſoon as it is out, and not able to continue that Line, the Air being near equal on all Sides, it expands and forms a Vacuum every Way, but moſt forward in Proportion to the Length of the Barrel, becauſe the Direction it had given by the Spirit, following in at the Touch-hole, thro' the Pores of the Barrel, *&c.* continues in a Line. The Moment a Vacuum is made, the Smoke is condenſed, and the Air puſhes in from behind, and drives the Æther and Smoke in the Line the Motion is given, *&c.* as aforeſaid. If there be a Ball, it goes foremoſt, and is driven by the Fluid and Smoke as far as it moves.

If a Touch-hole could be made ſo ſmall, that Fire could enter, and not ſufficient Air to counter-ballance the Preſſure of the Air before, would not the Force tend backward, and cauſe a great Recoil at firſt.

The Air drives thro' the Touch-hole, and in at the Muzzle, even while the Flame is iſſuing out, and that makes it move ſo violently. The Direction of the Force in blaſting, is in the Direction the Air enters at the Touch-hole, ſo it is much the ſame if the Hole be only ſtopt with Clay, Wax, or Wadding before it.

The Preſſure of the Air is equal upon any Space filled with it, and included by Solids, if the Inlet be never ſo ſmall, becauſe the Preſſure of the other Air upon the ſmall Æther in the Sides of the Veſſel, or Body which include the Air (when the Maſſes within and without are of the ſame Size) will be near equal; or preſs equally on every Part, ſo upon Fluids, as Water, &c.

The Matter which goes off from the Center where Gun-powder is fired, exerts itſelf outward near the Center with more Power than the Corpuſcles or Maſſes of Matter which come into its Place, becauſe they come from every Side, eſpecially when they are directed by Solids to one Line. Firſt Motion outward, and ſecond inward, commence at once. All act at once, and each watch for freeſt Paſſage or a Vacuum, and both move Sideways.

If it be true, that the Sphere of Air puſhing into the Vacancy, contribute to the driving off the Bullet, if a Gun were fired by the Side of a Wall, the Reſiſtance of the Wall would form the Vacancy into a half Sphere, perhaps of equal Capacity to the Sphere it would have made, if it had not been reſiſted. *Qy.* Whether the Ball will be diverted from its Courſe, by the Air puſhing after it on one Side towards the Wall, or the Force of the Fluid repulſed from the Wall will be equal. If a Gun were fired with its Muzzle near a Hole, ſo large as to let the Bullet paſs, would the Puſh with the Powder againſt the Sides be loſt, and weaken the Ball, or would it follow thro' the Hole?

If a Bullet were driven into a Gun-barrel, a little Diſtance from the Muzzle very cloſe, and the Remainder of the Barrel heated, and the Touch-hole kept cloſe till it were heated, and then open'd, would not the Air drive out the Bullet? Perhaps where Powder is fired, it may divide a greater Quantity of Maſſes of Air than the Barrel once full, However the Parts of the Sulphur, *&c.* take Fire when they and the Maſſes of Air are puſhed in and divided very ſmall. If there be any Parts of Water, they will then puſh in and make that Noiſe we hear. And if for a great Depth, the Maſſes of Air be divided, the Parts of Water will ſink, form into Drops, and fall as ſuddenly as Diſtance and Reſiſtance will allow. Gun-powder will Fire leiſurely in Vacuo, and at laſt expand. The Heat in melted Lead, or other melted Metals makes a Vacancy of Air, Humidity, *&c.* and Water, or perhaps air, put upon, or into the melted Metal, expands, and ſerves for an atmoſphere to act as Smoke of Gun-powder doth. If it be put upon the Surface, it acts like Powder fired in the open air. If it be put any conſiderable Depth into the Metal, it forms itſelf a Paſſage like a Barrel thro' the Metal, and moves in that Direction.

One would think this Æther [Light] being once moved by great Guns, or &c. would pervade a Wall or any Thing, and with the air [Spirit] on the other Side, move Windows, &c. unleſs the air [Spirit] hinder it. And if ſo, it muſt be by the Recoil of the air paſſing over, that the Windows on the oppoſite Sides are moved.

Hang a Globe here in our atmoſphere in a Line, and fire Powder, or do any act to thin and divide the Parts, on one Side, as ſoon as the Diviſion is performed, will not the Parts of Light fly off, and the air puſh againſt and move the Ball *? I think a very hot Iron placed there, and moved off ſuddenly, would do the ſame.

If

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* Yes! And it appears beyond Diſpute, by the electrical Experiments, one of which is referred to in the *Propoſals*, that the Air is the Agent which performs all the Operations of Nature. You may there ſee every Thing performed in Miniature by this Agent; the Friction of the glaſs Globe, or one of Sulphur, ſplits and divides the Maſſes of Air, and a Stream of Air ſo thinned, runs along the Gun-barrel, and ſo againſt the Surface of any Solid in its Way; and either paſſes thro' the Body, or runs along its Outſide; or rather Part goes thro', and Part along the Outſide; and it is the different Texture of the Parts of the Body, that their being *Electrical* or *Non-electrical*, as it is called, depends upon. Metals have nothing in their Pores but the Fluid of the Air, in a Condition as fine or ſubtle, as the electrical Stream itſelf, and ſo the Atoms of the

If an empty Receiver were broke in the open air to Powder at once, the air would puſh in and drive upwards, as aforeſaid.

If

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electrical Stream act upon the Atoms in the Pores of the Metal, in much the ſame Manner, as Light upon the exhauſted Receiver, which reflects it ſtronglier, than the condenſed does; ſofter Bodies elude the Force of the electrical Stream of Light; the Re-action of the groſſer Air thro' their Parts diſperſes ſome, and the Pores themſelves admit ſome of it, and ſo the Stream is not kept together, as it is long a Gun-barrel, Roſin, &c. [whoſe Pores are known to admit little or no Air thro' them] and its Effects cannot appear to the Senſes, as in the other Caſe. The Gun-barrel, nay our Bodies alſo, whoſe Pores are filled with Atoms of the ſame Size, or nearly ſo, as thoſe in the electrical Stream, ſerve like Canals to water, the Banks of which are the groſſer Air that ſurrounds it and us; touch the Gun-barrel with your Finger, or Iron, and the Light darts out, ſnaps, and you ſee and hear its Effects very ſtrongly. Touch a Perſon that is electriſed, *i. e.* who ſtands in the Stream of Light iſſued a long the Gun-barrel, and ſo is in what they call a Vacuum, cover'd all over with it, touch this Perſon with a Sword, and it gives a violent Stroke, a prodigious Shock; you break down the Bank as it were, and let in the Spirit or groſs Air in that Line which acts immediately upon the Atoms of Light in that Point, and with a Force, like that of the Spirit at the Touch-hole of a Gun, drives it before it againſt thoſe in the Pores of our Body, and ſo on; and affects us ſtronglier than a Blow on the Outſide; becauſe the Impulſe, or Stroke is here communicated immediately to the Steam our Bodies are actuated by, and ſo to the Nerves, &c. When they ceaſe turning the glaſs or ſulphur Globe, all the Effects ceaſe at once; the Spirit diſperſes the Stream immediately, and it mixes equally with the reſt of the Air in the Room; but as long as a Stream keeps running a long the Gun-barrel, or &c. ſo long the Effects will continue. A Pin held with its Point to an electriſed Feather, the Feather contracts and drops; turn

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If a barrel were fixed at one End of the Receiver, and the other End of the Receiver were broke, the Air would diſcharge

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the Head, it riſes, and the downy Part of the Feather expands itſelf, as the ſenſitive Plant does ſome Time after it hath been touched: The Point of the Pin directs the Spirit down in a Point to the Feather, and it diſperſes or drives back the electrical Stream, and compreſſes the Feather; turn the Head towards the Feather, it riſes again: If the Head of the Pin do not *attract*, and the Point *repel*, than the Stream from the Gun-barrel, at the End of which the Feather ſtands, may raiſe it again, after the Spirit directed in a Point to it by the Point of the Pin, has ſqueezed it up, becauſe the Head of the Pin makes the Spirit, like Rays or Lines from a Globe, diverge, ſpread wider, and ſo miſs that Part of the Stream which is flowing into the Feather. But it would take up too much Time to explain all the electrical Experiments; but it is plain, they are Demonſtration, viſible ocular Demonſtration againſt that which that learned Body the *Royal Society*, ſtill continus to call Philoſophy, a Vacuum, Attraction, Repulſion, Elaſticity, and the other imaginary or occult Qualities, and unmeaning Words which they ring the Changes upon, and which by their Authority, great Learning in other Points, Number, Poſſeſſion and Prepoſſeſſion, they ſtill put upon the World for Natural Philoſophy. When we ſee Light penetrate the Pores of Braſs into the exhauſted Receiver, and that the Air, notwithſtanding its Elaſticity, conveys it a long inſtead of ſtopping it, and can't *conceive* how an Atom of it could come from the Sun, unleſs puſhed a long all the Way; nor how it can be puſhed a long, unleſs touched on every Side; who can help wondering, and if good Manners did n't forbid it, laughing at the preſent Syſtem of *Optics*, and the Arguments from thence againſt a *Plenum*?

When we ſee a Ball, turned round and go forward by the Stream being iſſued againſt one Hemiſphere of it, and ſee it turn on its own Axis at the ſame Time, and that faſter and ſlower in Proportion to its progreſſive Velocity; and that charge a Bullet thro' the Barrel. Or a Receiver filled full of Steam, and diſcharged thro' a Barrel would do the ſame. Or if the Steam were ſuddenly condenſed with cold Water, and the Air ſuffered to puſh in, it would do the ſame.

How is this performed in Thunder and Lightening! What divides the Æther! The action is as Gun-powder, and the Lightening recedes as other Fire doth, and the groſs air puſhing in amongſt the Clouds, Thunders.

Dr. *Lowthorp*, ſays, the Steam ariſing from Peritis in Coal-Mines makes the Fire Damps. Peritis waſhed I ſuppoſe out of Clay, and driven in Storms over the Beaches in *Eſſex*.

Filings of Iron and Sulphur, and mixt into a Paſte, and buried under Ground ten Feet, will blow up the Ground.

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that the Fluid of the Air, inſtead of retarding its Motion, is to Sight the Cauſe of it, in what a ſtrange Light does the centripetal, and centrifugal; the projectile Force, and the Dream of empty Space, for the Orbs to move freely in, appear to us. To theſe Experiments therefore, we appeal for Proof of a *Plenum*, the Manner of Formation and Propagation of Light; the Cauſe and Manner of the Motion of the heavenly Bodies; and tho' they who think themſelves in Poſſeſſion of the true Philoſophy, may call it *beneath* them to enter the Liſts, yet others will aſcribe their Silence to another Cauſe.

Hints and Conjectures about the Cauſe of Magnetiſm, taken from looſe Papers.

* IF the Motion of infinitely ſmall Corpuſcles put into Motion by the Sun, or ſome other Agent, ſucceſſively rebounding, till they return thither, be the Cauſe of Gravity, ſuppoſing the moſt will rebound from a vaſt Arch, which incloſes all the viſible Globes, and ſome from one Globe to another, their greateſt Force will tend in a Line to the Centre of each Globe, as Gravity does.

And if a Loadſtone, or any other Body in one Poſition, can reſiſt, or ſtop theſe Corpuſcles from pervading its Pores, another Body being pretty cloſe, and ſtruck

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BOOKS on the Loadſtone.

J. Faiſnery de Natura Magnetis, de Fluxu, et Refluxu Maris, et de Motu. Col. 1562.

Dr. *Ridley*'s Treatiſe of Magnetical Bodies and Motions, Lond. 1613.

R. Normans's new attractive of the Loadſtone and Declination of the Needle diſcover'd.

Mr. *Barrow's* Diſcourſe of the Variation of the Compaſs. *Lond.* 1614.

Mr. *Barlow*'s Magnetical Advertiſement. *Lond.* 1618.

H. Gellibrand's (Profeſſor of Aſtronomy at *Greſham* College) Diſcourſe of the Variation of the Magnetical Needle, *Lond.* 1635.

Mr. *Barlow* has the Account of piecing Stones.

by the rebounding Corpuſcles in other Directions, muſt be preſſed towards that Body. And if theſe Corpuſcles paſs each Way in the Direction, which we call the Poles of the Stone, in ſome ſmall Quantity, will not thoſe they keep off weaken the force, and let the others preſs a Needle thither? and will not the Motion of thoſe which paſs and repaſs ſet it endways? and will not more of theſe Corpuſcles paſs the Earth in a polar line, or more ſtrike upon its Ends, and rebound, and both of them rebound back again upon it in theſe Lines, than there will of theſe which paſs thro', or ſtrike and rebound, and are rebounded back again upon it in the other oppoſite Direction? and if the Corpuſcles of the Loadſtone be preſſed once through the Iron of a Needle, ſo as to ſtop the other Corpuſcles, will not the Motion of thoſe Corpuſcles direct its Point *N.* and *S.* But why the ſame Point the ſame Way, I cannot tell, unleſs the Pores be ſo framed, that the Corpuſcles paſs but one Way, as in at the *South*, and out at the *North*.

If the Corpuſcles ſtrike from all Sides of the Arch and Globes, theſe which ſtrike on each Side, are ballanced by thoſe on the oppoſite Side, thoſe aſlant, by theſe aſlant, but both preſſing downward, and thoſe perpendicular all preſſing downward; and only thoſe pervade us from below.

The Part of the Globe the Moon is directly over, muſt receive the Rebounds of theſe which come from it, cauſe a greater Preſſure, raiſe the Tides each Way, &c. and ſo of any other Globe in Proportion to their Diſtance from the Sun, &c. Will not the Waters riſe under the Moon? and what Effect may this have upon the Globes, to cauſe the Direction of their Motion? The Rebounds of them from the Moon to the Earth, and from the Earth to the Moon, ought to be well conſidered. Draw a Scheme and ſee will any from the great Arch ſtrike their oppoſite Sides, ſo as they can rebound from oppoſite Side, to oppoſite Side directly, I think not, but Query, and the ſame with reſpect to the Sun, &c. and conſider if they will not move their Courſe to that Side, where there is the leaſt Preſſure? Draw Lines in the Scheme to ſee which Way the ſeveral Motions of theſe Corpuſcles will tend. They muſt be ſo ſmall, that they will adhere to nothing, but always rebound, and their Rebounds muſt not be equal to the Force that firſt jets them, *and there muſt be a firſt Motion, to ſet them or ſome other Agent or Power forward*, and it is moſt

rational

rational to believe that God acts by Matter here, and that the firſt Motive is at a Diſtance out of our Reach. The Elaſticity of Air cannot preſs any Thing towards the Centre, becauſe it preſſes equally on all Sides, as well upward as downward: but any bodies jetted from the great Arch direct their Force towards the centre, becauſe the Globe intervenes, and hinders them from ſtriking directly, or in a diagonal Line upwards,— That there is ſuch an Effect is viſible.---That either there is ſuch an Agent, or that 'tis done without an Agent by the Almighty Power is certain.— That ſuch may as eaſily move from all Sides of the arch, as Light does from the Sun, is conceiveable; how God does it without an agent is inconceiveable.

Conſider this Matter well, If theſe corpuſcles be puſhed from all Sides of the great arch towards this Globe, if the Moon intervene, will not that take off the Preſſure under the Moon? Will not Water riſe there? and what Effect may this have upon the Globes, to cauſe the Direction of their Motion?

If there be ſuch corpuſcles ſo moved, many of them muſt ſtrike continually upon the corpuſcles of the air, and puſh them aſide, or paſs between them obliquely till they reach us; and if the air be charged wirh Humidity, perhaps the corpuſcles of Water may be ſtrong enough to reſiſt them, and rebound them, or take off their Force, ſo as to leſſen their Effect or Gravity here. The Gravity of bodies in Vacuo is not otherwiſe altered, than by taking away the reſiſtance of the air, and the cloſer any body is, the fewer of theſe corpuſcles will pervade it, and the more of them will ſtrike againſt it, and force it the more towards the centre; and though they may puſh a feather with the ſame ſpeed in Vacuo, as they puſh Lead, yet not with the ſame force: And the Increaſe of the Velocity of bodies towards the centre, will increaſe in Proportion to the repeated Puſhes of theſe corpuſcles, or the Succeſſion of new corpuſcles ſtill puſhing and adding force to force. Whether theſe corpuſcles immediately rebound from each Globe, or are expelled by the ferment within each, or are thrown off by the Rotation of each; Whether in a perpendicular Line, or in the Line of each of their Tangents, will make no great Variation, and what Variation they wou'd make muſt be conſidered.

If the ſtrongeſt Motion in the Fluid proceed from the Sun, there will be leſs at the Poles, hence may proceed the cauſe of the Needle's pointing *North* and *South*.

If the Water in the Abyſs can be divided ſmaller under the Line, by the ſmall Parts which enter there, then there will be a continual Proceſſion of groſſer Parts from the Poles, and a continual Receſſion of ſmall ones thither.

Whether ſomething of this from below or ſomething like this above, contribute towards the Direction of the Needle? Whether this Action happened in the Waters while things were forming, and ſo formed the Loadſtones, or whether they were formed in the Veins which were *North* and *South*, and that Action happened in theſe Veins?

Whether the Rotation of the Earth at the Formation, could make the heavieſt Corpuſcles turn their Edges, or heavieſt Point the Way the Earth moved, and the ſmall recede the ſame Way, ſo that their heavieſt Edges would be both one Way, eſpecially the Loadſtone; ſo that it might be formed in Lamina parrallel to the Ecliptic, or *&c.* Or, whether they might be in Circles as the Earth turned, or, if the Hematites could have any Aſſiſtance this Way?

Q. Whether the Loadſtone was formed in the Water, or in Veins? Q. If any one a coled Nodule?

Q. Whether the Direction the Shemoſh moves in, did not ſomething in diſpoſing its Corpuſcles?

Mr. *Alexander Hay*, thinks Loadſtones to be the inward, or fineſt Parts of Maſſes of Iron Oar——Proof might be made by marking and cutting ſuch Parts out of Iron Veins.——

Whether they took their Poles by the Direction they lye in the Veins, and were formed by approaching, or when nearly approached; or they are ſhoad Stones, and have taken their Direction by lying there?

If a Loadſtone were formed between two Sides of a Vein, or between any two things which were ſolid each Side might attract, and turn the Corpuſcles which were neareſt to itſelf——but then, how was it begun? If it iſſued out on one Side, itſelf would attract more than the oppoſite Side: If it iſſued out of both Sides, then it muſt meet and unite in the middle: If it had formed from the Union of Corpuſcles, or a Centre between them, then it muſt be formed by the double Attraction each way from the Centre, and from the Attraction of each ſolid Side of the Vein, and the laſt might perhaps direct the application of the Corpuſcles.

Is not the Loadſtone a Mixture of Talk and Iron? See the large Stone at the *Royal Society*, whether it be formed in a Vein, or how?

Iu the attraction of the Pebbles the heavieſt came to, and the lighteſt flew from, and ſo ſeparated; was the Loadſtone formed ſo? and with their heavieſt Ends firſt?

Magnetical advertiſement by Mr. *Barlow Lond.* 1618. he names another Piece, called *the Navigators Supply* writ by him. p. 2. Bricks while hot and Parts in Fuſion placed *N.* and *S.* take attractive and directive Powers.

As each Part of a Loadſtone when divided forms to itſelf new Poles, it muſt be the Centre of the Stone in a certain Direction, that is the Pole, or axis; and if a Hole were drilled through it, would turn equally on its Axis, or fixed between two Points, the ſame.

So ſeveral Loadſtones cemented together, form a common Pole to them all; if they be not cemented with their former Poles parrallel, they, I think, will have contrary Effects, and confound one another

ther, unleſs one of them could ſhift the Atoms of another, or turn them the contrary Way.

Stones muſt be placed in order to cement them in the ſame Direction, as if they were cut one from another, and then Poles, Equators, ſhift, as they do when a Stone is cut, and reunited.

The Obſervations about the peicing of Loadſtones is in a Book bound up of ſeveral Pieces, called *Magnetical Tracts*, in Dr. *W*-----'s Library.

If a Loadſtone be exactly round, the Poles, muſt be from the Diſpoſition of the Corpuſcles, either in reſpect to the Solidity of one Part more than another, or from the Ends, or Edges, or Hollows of the Corpuſcles being diſpoſed in ſome Poſition.

Loadſtones, Needles, *&c.* if at Liberty, and the Power ſufficient, all are moved, each with its Pole to the contrary Pole of another, ſo as to make a continued Line of their Axis's, and ſo as that their Unites may in that Line, be all pointing with their ſame Parts, Ends or Sides the ſame Way.

Thoſe Bodies which are compoſed of Unites, which can be made magnetical, ſuch as the Earth, Loadſtone, Iron, *&c.*

are ſo formed, either firſt by the Motion of the Æther, or by that Agent by the Aſſiſtance, or Interpoſition of one, which has a ſufficient Degree or Capacity by making the Unites of the weaker, conform to the Poſition of thoſe of the ſtrong ones, aſſiſting or interpoſing——So the Æther, thoſe of the Earth; ſo the Earth, thoſe of the Loadſtone; ſo the fineſt, ſtrongeſt blue Stone whoſe Unites are ſtrongly fixed, the Unites of ruſty or———Stone which are weakly fixed. So all Stones, thoſe of ſteel or Iron. So ſoft Iron, ſooner than thoſe of ſteel. So ſoft ſteel, ſooner than that of hard ſteel; but the harder the Body in which they are moved, the ſtronger and longer they retain their Poſition.

And the greater Weight they lift, if that Weight be too great, or the Interpoſition of another whoſe Force is great, be too long applied, and too ſtrong, it will turn the Unites in the weaker, and deface the Power, as the Action of Fire does in any, and I believe the force of a Hammer, &c. in Iron will. They ſay that they will recover their Poſition, if placed while they are hot parrallel to the Poles. if otherwiſe not. They mention not what Stone quenched in water will do, but Iron or ſteel quenched when hot in Water, not only loſes that

Poſition of Parts, but renders theſe Parts ſo fixed, that the Loadſtone cannot move them.

Thoſe Stones from *Eaſt Indies* the fineſt and ſtrongeſt.

The one pole pulls at the one end of the Needle, the other at the other equally at the pole as the Needle approaches, either Pole, more at that than the other; thence Inclinations.----Or rather every Part of the Axis pulls, and the part neareſt the Needle moſt, and as there is more of the Axis towards one end, than towards the other, more in ſome certain Proportion towards the longer end, equally each Way at the middle, and all one way at each end or pole, whereby the South end of the Needle, is drawn to the North end of the Earth or Stone, and the North end to the South end.

The preſſure of the Æther greateſt from *Eaſt* and *Weſt*, before the inner Globe was formed, and ſince greateſt that way againſt it, and leaſt from it; ſo the Unites are turned with ſome certain ſides all that way, or parrallel to its Axis, perhaps with their planes parrallel to the Equator, and that Difference or exceſs of preſſure turns them in the Needle, when applied to the Stone, and turns it when from the Stone in Water on a pin, &c. Are theſe in the Needle turned the ſame Way as thoſe in the Stone? Does the preſſure make any Flux, or Reflux of the Æther in the Line, from Equator of the Earth to each pole, or from pole to pole.

Every Unite muſt have the ſame property as the whole, that is liable to be turned with one end, by reaſon of its Figure to the Pole, whether it be that the heavieſt end goes foremoſt, &c, and turning them makes the Body liable to be turned the ſame Way.

If the Loadſtone be found ſingle, as *Norman* ſays whether it be a nodule, or fragment of Stone, or Oar or Veinſtone, then 'tis likely it acquired its properties by lying long in one Poſition, as they ſay, an Iron Stantion or Window bar will, and that muſt be by the Æther paſſing through in one Direction. Indeed, they needed no Loadſtone nor Needle at firſt; ſo it might anſwer the end, if it had its properties in time.-----He afterwards talks of Loadſtones found in Iron Mines; ſo it appears not from him whether it be this or that.

It does not ſeem ſtrange that, that force which forces the corpuſcles cloſe to one another, when they are removed at one end each from its next Neighbour, by bending the Body, ſets them cloſe and the Body ſtraight, and ſtrikes over, ſhou'd twine or ſet the corpuſcles of Steel in ſome certain Poſition on the ſurface of the Steel next the Stone, when the expanſive force is kept off on one ſide by the Loadſtone: nay, that when the ſurface of one Iron is ſo formed, that if another Iron be laid to it, the latter ſhould be altered in ſome degree, and ſo on. Perhaps puſhing them near together ou each Side, and flat Ways, may do the Buſineſs cf Attraction, and perhaps twining them in ſome Direction, may do the buſineſs of the Direction; and if beating them with a Hammer, or bending them forward and backward or twining them, take the Power from the Needle or Peice of Iron, as heating them they ſay does, then 'tis plain 'tis in the manner and nearneſs the parts approach each other: And by this means the Arms of the Loadſtone may in time, have all their corpuſcles ſo ſet, as they may have ſome of the ſame effects as the Stone itſelf. But if they were taken off from the Stone, will they then give the directive power to a Needle? or will Aqua fortis immediately take the Virtue from one of the Arms taken off, or from a touched Needle.

When Iron is placed againſt a Loadſtone, ſo that the expanſion does not act on one ſide, the pillar on the three other ſides, may vary the Diſpoſition of its corpuſcles, or ſome other way without the Stones communicating any Parts, Q. If Loadſtones were placed on every ſide, or, &c.

Try what it will do with the edge of Razor, a very thin Plate. &c. The Parts of the Stone, each ſet all the Filings or Duſt all one way.

A Loadſtone ſhould be uniform.----That which Mr. *Whiſton* ſhew'd me which was plated, had its Poles uncertain. or in a Line.

His Notion that the South pole of the magnet is a circle of 40°, is coroborated by a Loadſtone formed in layers like a ſlate, whereupon a Needle ſtands upright in a line for two inches---------and from ſome uncertain Obſervations.

Ridley page 19. If a Stone, &c. ib. page 22, 25.

Q. They ſay the Loadſtone is the hardeſt to cut of all others except a Diamond, and the beſt is not much ſofter than a Diamond.

If a Loadſtone were cut into the figure of a croſs, with four legs, or with ſix, how wou'd the poles ſtand then? Will Water dry as ſoon from a Loadſtone, as from another Stone?

Is it poſſible that Effluvia of the Stone, can paſs into the pores of the Iron, or only ſtick, in its ſurface, and ſtop the Pores, that might be tried by filing of the ſurface. Touch

How comes it to the End of the Pins? it does not paſs through the braſs cap.

A current of Æther through it.——A plait of any metal put between it, and Iron diverts the courſe.

Do the atoms enter to the centre of a Needle, or will fileing of the ſurface take them away? I think fire will take them out; I think they ſay the fineſt cloſeſt ſteel touches beſt.

If the ſouth part of the Loadſtone (as *Norman* ſays) touching the point of the Needle makes it regard the North, then one wou'd think the Æther pervaded in ſharp ſtreams through the Stone, and gave ſome Directions to the corpuſcles, ſo as to form lines or pores the oppoſite Way; and if ſo, there would be a ſtream of Æther to drive off the Air; and that Æther muſt paſs through the Iron, to let the Air preſs the Iron to the Stone, ſo I think he is miſtaken. I know not whether any tryal has been made with a Terrella. How the

Needle would point if it were touched with one point at the line, or one point a little on this ſide, the other a little on that ſide.

The Loadſtone taken from the Earth, within the Earths ſphere of attraction, one piece of a Loadſtone cut off another, within the ſphere of the ſtronger part, a peice of Iron or Steel or Needle, touched by a Loadſtone in the ſphere of the Earth, or a Loadſtone's Attraction begins with its firſt Motion to put every unite in it, with the ſame points the ſame Way, as thoſe in the greater, and in the ſame line, ſo as to make a continuation, or add the length of its own pole, to the length of the greater pole. If the axis of the ſmaller be placed parrallel with the Axis of the greater, and with the Diameters of their Equators in the ſame line, and the South end or pole of the ſmaller, neareſt to the North end or pole of the greater, the South end or pole of the ſmaller, moves in a curved Line, lifting its North end or pole by degrees, till the South end or pole of the ſmaller, come to the North end or pole of the larger, and lengthen or continue their Axis in a ſtraight Line. If their Axis's be placed parrallel, and the diameters of their Equators in the ſame Line, and with their North ends neareſt, the firſt Motion, the ſmaller makes, is to turn it ends, and proceed as aforeſaid: And ſo, and no otherwiſe, if the ſmaller be placed in any part of that curved Line, ſo placed their ſtrengths are joined; if you let them joyn after the ends of the ſmaller are turned before they come to that point, they weaken one another.

Can the Moon make any ſuch Attempt to join herſelf to the Earth, and be eluded, and ſtill in purſuit, by the flying Motion of the Earth?

There can be no difference between a piece of the ſame of one end of a Loadſtone, and that of the other, except the ſame ends of the unites of each end, were to turn to the Centre; as for Example, the larger Ends and the ſmaller to each Pole, and they or half of them muſt ſhift off. So when a Stone is cut, but I think they are all turned one Way.

There muſt be a polarity in each of the Unites of the Selenites, Talks, Spars, &c. which may direct the Formation of their Figures.

Will a round Plate, or Globe, or ſphere of Iron touched, ſhew the Poles of the Magnet touched in two Points, or touched in every Part, half by one Pole of the Stone, and half by the other?

If the *South* part of the Loadſtone, *&c.* (as before at page 319) The arms of Iron convey the Virtue of the Loadſtone from each Pole, to thoſe Points; how thoſe Points reject the oppoſite ends of the Needle, I do not well remember.

They aſcribe Poles to the Corpuſcles of Selenites, and diverſe ſorts of Salts to make the parts come together in Rank and File; if each ſort have diſtinct Figures, and be ſupported in ſuch a fluid as Water, and the Æther have a Motion in one Direction, or the Corpuſcles of Fire in the Æther, then it will turn them all the ſame Way, as the Points or ſmalleſt parts fronting the Point, from whence the Æther or Corpuſcles of Fire, or ſteam from below, or whatever it is that moves comes, or from whence it iſſues, or *&c.*

If this Æther be the cauſe of Union, or Adheſion of Corpuſcles, the near approach of the Stone to Iron, may twine or ſhift the Corpuſcles of the Iron, into ſuch Poſition as may enable them to direct or turn the Æther, or make it move in one Direction.

The Unites or Maſſes of Metal which are ſo eaſily moved with a gentle ſtroke, and puſh out the Air, and cauſe ſound (tho' thoſe of mixt Metals moſt) may be twined by the preſſure towards a Loadſtone.——— See if beating will take it off.

When the Loadſtone is moved over the Iron, the Unites are more preſſed through the Iron, than they are through the Loadſtone, may eaſily turn; and if the Stone were poliſhed, wou'd almoſt leave the Iron, and perhaps moſt of them in a thin Maſs may be turned ſo, becauſe theſe in a Maſs, applied to the arming of a Loadſtone, are moved to the Stone through the arming and turned at that Diſtance, and may be much more ſo, when the Iron of that thickneſs is entire.

Touching a Needle with a Stone, may make ſome of the Corpuſcles where it touches, ſet flat; thoſe at Diſtance ſet edgeways, thence may be the different Directions of the ſeveral parts of the Needle Mr. *Lowthorp* ſpeaks of.

One may ſee by the Loadſtone's ſetting the filings of Iron, how its parts are ſet, and how it ſets the Unites of the Iron at touches.———Whether edgeways or broadways to the Pole? Qu.

Barlow page 36, 37. Capping is beſt of ſoft Iron———the Stone lifts more of ſoft Iron than Steel, but Steel retains the touch longeſt, as I think they conclude, that the parts or Unites of the Stone, are not turned cold when joined with another Stone, wou'd not Iron turn beſt hot? What wou'd a touch do to Iron hot?

Mr. *Whiſton* ſays, they touch the Needle upon the Stone, that of Iron arming will not endure, when the dipping Needle is ſet.

Ridley page 90. Steel hardened will not take the touch, let it down it will take, and keep it better than Iron.

Iron touched has the attractive Power communicated, but not the directive Power, Mr. *Whiſton* ſays, and that Needles or fileings, will ſtand or lye in any Direction upon any part of its Surface: Has a Maſs of Iron been touched all over regularly to prove if it wou'd take poles? If ſo, and it did not, then.

Q. If filing the ſurface of a touched Iron, take away the touch?

Q. If Stone will communicate any Virtue to Steel without touching it?

Dr. *Lowthorp* ſays, the touch runs to each end of the Needle, and is at the end of one Pole, and a little diſtance from the other Pole, and the middle has no Virtue:

That force which ſets a Spring back, ſets the Corpuſcles of Iron by the Application of a Loadſtone.

Does Fire alter the Texture of the Stone, or hinder its effects, it opens Pores where the Fire paſſes, ſo lets the Æther paſs, and the oppoſite pillar preſſes through it upon the Iron. Æther may be rarified in paſſing through the Loadſtone; if ſo, it muſt either meet in the centre, or paſs in one Direction through the poles. Fire takes away the Virtue of the Loadſtone. Destruction.

Q. If it attracts in a great heat through a flame, or a heated Body, or &c? for perhaps this ferment which Occaſions Gravity, does not pervade them and Iron, and ſo the preſſure of it, and the Atmoſphere brings them together.

If this fluid cannot pervade them, it muſt wheel off to each Pole as I imagine, but more to the *North* Pole, becauſe we are on that ſide of the Equator, then will not the Variation be greater nearer the Poles?

Will a Loadſtone take away the Elaſticity from a Watch-Spring, or ſmall piece of Wire?

Conſider that if the ſmall Parts have paſſage through a Ball of Glaſs forward, the parts before muſt recede by the ſides Æther.

of the Ball, to ſupply the defect behind; they muſt divide at the Focus, and thoſe which fly out ſideways are changed for larger. Conſider what this can do, if there be any paſſage through a Loadſtone, the Earth, &c. And what gave the Motion to the Æther.

I am not ſatisfied with their Reflections, and Refractions; when Light has paſſed through a Body, and is weakned, the Air preſſes it towards that Body.

The Air has ſpace for all the Light to move in every line; it tends to unite and go in one line thro' a Globe.

Something like this tendency muſt be in a Loadſtone. I think not two Poles on each ſide but the outer, if there be any, may be occaſioned by the Effects of the Sun.

Q. What I have ſaid——If Stone attract more than Iron, it may take parts out of the Iron, and open paſſages for the Æther in a certain Direction.

Needle expelled at contrary ends by the Stone till they touch, or come very near, then attract. I ſuppoſe the Æther gliding off the Sides of the Stone, diverts or expels the Needle, till they come ſo near, that it paſs on each Side.

The Motion of the Needle muſt be determined to the Meridian, by the Motion of the Æther, with the Rotation of the Earth, which raiſes the Compreſſure of the ſideways Pillars of Æther; thoſe from the *North* and *South*, being of different Powers from thoſe from the *Eaſt* and *Weſt*, and thoſe adjacent to each in Proportion.

And the Variations may be occaſioned from the different Parts of the Earth, being compoſed of different ſorts of Matter, or of different Solidity; ſo that the Pillars of Æther, where it is in Motion, may be ſtrongeſt.

Q. Then the Variation of the Variation.

Tho' a great part of the Æther paſs through the firſt Shell, and ſtrikes upon the inner Globe, yet part glides along its ſides towards each Pole; and that which ſtrikes upon the inner Globe, alſo glides and repaſſes through the outward Shell, and there jointly, or ſeverally direct, *&c.*

Where Corpuſcles move in one Direction, there is a contrary Motion of others, as lighter, or heavier, or *&c.* in a contrary Direction.

Where a Body moves one way, the Fluid adjoining, moves the contrary way.

Where a Body moves in Air, it may move ſome of the Air, before, or with it, becauſe Air may entangle. Qu. How Æther moves if it does not entangle?

Conſider how it is, where the Fluid is compreſſed or expanded.

If any Æther come from the Sun to the Earth, it muſt go through, or off at the Poles, or part each way, part in, and part off at each Pole, dividing at the Æquator. 'Tis likely there is a conſtant acceſſion of the groſſer Parts from the Poles to the Sun; both without and within, and a recedence of the ſmaller, beſides what paſſes through the Globe, or the Shell.

By any thing I can judge, the Æther if any ariſe in Lines from the Surface of the inner Globe, to the Surface of the Shell, muſt riſe from each Point in different Lines, as Light emitted from the Sun, to a Body at that diſtance, and of ſuch a Figure does. But this cannot be from the Sun on each ſide at once. If it be ſo, it muſt ariſe from the Compreſſure it has upon the Parts neareſt the Æquator in its Motion, more than upon other Parts.

If the motion of the Æther, from the Æquinox to the Poles be exact, and Preſſure *pro* and *con.* be exact, and the magnetical Poles ſtand aſide from that Line;

what may theſe two different Lines, and their Points do inſtead of four Poles; or may Mountains, &c. divert the Courſe of the Æther; try in an Eddy, as at Whinlatter.

Conſider how the Rotation of the Earth, the Motion that gives to the Æther, whether that Æther has any conſtant Motion into, and out of the Earth? Whether it enters at the Poles, and is thrown out as I imagine it is at the Sun conſtantly, or it enters and riſes caſually, or perpendicularly. The Pillars of Æther and Air which paſs by the outſides of the Globes, muſt direct the falling of Bodies. But the Æther which riſes from below, or paſſes through the Globe, Sphere, or Shell, muſt direct the Needle, and it muſt always ſtand to the Point, where either moſt or leaſt paſſes.

Conſider well how the Æther wou'd act, if it rebounded according to its angle of Incidence, upon ſuch Bodies as it could not pervade.

If there be ſomething goes down, and is rarefied in the Sphere of Water, ſomething alſo comes up.

Tho' the Pillars which gravitate Bodies be of infinite Length, 'tis likely thoſe which direct the Needle are but very ſhort, and if they iſſue out of the Earth, 'tis likely reach not far from the Surface. The dipping Needle might be tried upon the Monument; but as it does at Sea, it may do there.

Can the return of the [Æther] upon the Rotation of the outer, or inner Globe, do any thing in directing the Needle? that wou'd be flat at the Æquator, and perpendicular at the Poles.

The Æther, or &c. which returns from the inner Globe, not being able to pervade the Stone or Needle, or leaſt able at the Poles, turns them that way; but pervades all other Bodies in every Direction, and ſo does not direct them into the Lines it moves in.

Qu. If the Axis in a Loadſtone be not the Axis, it wou'd turn upon the longeſt way, and how applying other Parts by Cement alters it.

Will not the Pores if they lye parallel to the Axis, be the occaſion of turning the Stone here, if they be wider at the *South* end of it. But then the Stone wou'd not turn ſo beyond the Line.

What wou'd a ring of Iron do, if touched in one part, and put upon an Axis, either horizontal, or perpendicular. They talk of making a Loadſtone, which will attract ſtrongly, of very thin Plates of hardened Steel bound together and touched. Q. How placed?

Gravity muſt work with Air above a certain ſize, and magnetick Power with thoſe under that certain ſize, or more likely the contrary.

The power of Gravity acts upon all Bodies, whether the ther Æcan paſs thro' them or not----that of attraction through thoſe it cannot paſs in ſufficient degree, to interrupt that of Direction through which it cannot paſs, or can but paſs in certain Lines on its Surface, or through its Pores or Tubes, and the laſt Power is infinitely weak or ſmall; two or three Grains it ſeems caſting it any way in the ſtrongeſt Needle, and is the reſult or effect of a Tendency, either, of both the Æther and Light, or of Light, only from the Meridian of the magnetical Poles towards them; and as attraction from Loadſtones reaches but a ſmall diſtance, Variation or Direction is at much greater.

Mercury enters the Pores of Gold, by degrees, of this Solidity, and ſingle Corpuſcles of Salt, enter ſome of the moſt ſolid Metals by the ſame manner.

When a Needle, or any part of it is thus ſaturated, 'tis poſſible to conceive that the Æther may glide off each ſide, towards one of the Poles: but what determines each point to each Pole?

The Æther I ſuppoſe ſplits at the Æquator, and on this ſide tends only to this Pole.

Is that end of the Needle moſt ſaturated here, by the motion of the Æther which points *North*, and the other end on the other ſide the Line, or does one Pole of the Stone formed here, emit a greater quantity of theſe Atoms to the Needle, and ſo determine that point of the Needle touched with it to this Pole, and the South Pole of the Stones formed there, emit a greater Quantity to the end it touches? If that were ſo, wou'd not ſhifting a Stone over the Line, ſhift its Poles, or the ſame of a Needle?

If there be a groſſer Atmoſphere driven to about the Loadſtone, than about other Bodies, what will that do, reject the Needle, or *&c?*

The circular Impulſe by the thinner Air or Æther which pervades, is leſs upon the inner Globe, and the ſphere of Water its Atmoſphere, than that by the groſſer Air on the outward Shell, and its Atmoſphere by the viſible Difference.

Perhaps the Æther which pervades the Shell, has the ſame effect in Degree upon the Atmoſphere within, as that without, has upon the Atmoſphere of Air without.

And this Æther which riſes is ſo ſmall, that it affects nothing but Loadſtone and Iron, whoſe Unites are drawn all one Way.

Atoms from one Body cannot enter another, when the *Æ*ther paſſes through the Pores, except what comes with the Breath into the Noſe.

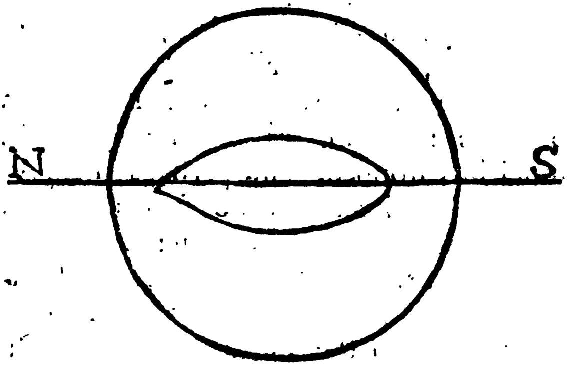
The Corpuſcles of the Loadſtone and Iron, and their Pores are ſo framed, that the *Æ*ther is not able to pervade them; and when their Bodies meet, the [*Æ*ther] either detaches from the Surface, or ſome ſmall quantity of *it* paſſes, and thoſe ſmall Corpuſcles paſs from the Body of one, into the Pores of another.

A Needle of Iron is perhaps very near from ſtopping the Æther before it be touched; and when touched, perhaps in that Part, perhaps in all the Body is ſaturated with thoſe Atoms, that it becomes ſo much more ſo, as that the *Æ*ther is ſufficiently ſtopped, and perhaps theſe Atoms can be directed by the *Æ*ther, which moves them into ſome Poſition: The Stone could not always continue to emit to Needles, if it did not reciprocally admit from other Iron, till the Pores be ſaturated in equlibrio, or equally; hence the Stone is ſtronger by ſteel Duſt.

Does ſtopping the Pores make it lighter? Does the Æther glide off, and not enter the Pores, and take ſo much hold of it?

If the Æther paſs not through the Iron, the Atoms will not fill the Pores from all Surfaces to the Centre; and by this Reaſon the Æther cannot take them out again, as it does the Atoms out of thoſe Bodies it pervades; thoſe Atoms muſt by the Laws of Attraction fill the Pores, and take place of the Æther in them, being more ſolid than its Corpuſcles, ſo long as its Pillars from oppoſite ſides do not pervade; this determines the Centre, What determines the Poles?

If that Centre be continued in a Line in any Direction, does not that determine the Pole? Is not this the Caſe of the Earth?



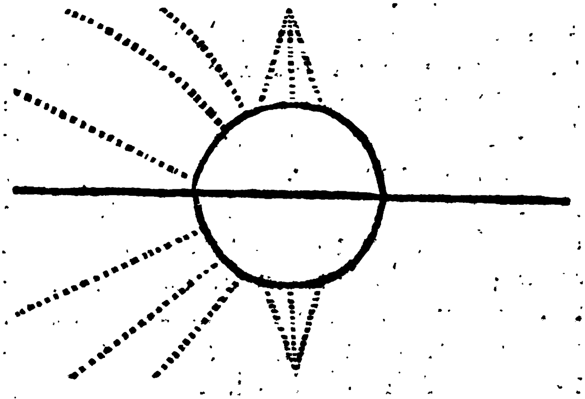
If the inner Globe rolled out into ſome ſuch Figure as above, and that the Æther being compreſſed againſt it from all Sides, and riſe up to the Surface in Lines at right Angles, from each Part of its Surface, as Light does from the Sun; that Globe may be ſo Figured, as that the Æther which riſes, may direct the dipping of the Needle. And if the *South* Pole be blunt, or near ſtreight on its Surface as deſcribed, the Needle may ſtand perpendicular for a great Tract about the Pole. And if the *North* Point be ſmall, and be aſide from the Pole of the Earth, the Needle will turn to that Point; and as the inner Globe moves, incline to, and ſtand perpendicular on each ſide of the Pole of the World, as the inner Globe ſhifts that Point.

Q. If there be any Motion in the Fluids on the Surface, from the Æquator to the Poles that can inflect this riſing Æther?

All this does not diſcover, why each Point ſtands the ſame way.

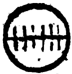
The force of the Pillars of Æther, are leaſt upon the Poles of the Earth, becauſe the expanſive Motion ſtrikes upon the edge of the Æquator moſt on one Side, and is repelled moſt on the oppoſite Sides, and puſhes rather gliding, or ſlanting towards each Pole; and leaſt active there, makes them freeze, and the firſt makes the Needle ſtand upright there.

The greater Force of the Light from the Sun, gives the Motion in the Line it goes. The ſhifting the Globe within, aſſiſts perhaps, both Motion and Rotation.



The Moons Place may weaken the repulſive Force on that Side, and let the Globe within proceed ſomething further in that Line, and puſh out moſt Water.

Like Byaſs in a Bowl, if the Æther have more Reſiſtance on one Side, than the other.

Q. The Plaits of the Loadſtone muſt be *tranſverſe*  *the Pole*, ſo that leaſt paſſes that way, and the Needle ſtands erect. Will it draw the Weight of caſt Iron, as Hammer'd?

If the Corpuſcles of Iron, and more eſpecially theſe which form the Loadſtone, be flat, ſo that the Æther cannot pervade through nor between them, or not in any conſiderable Degree, the Pillar of Æther, will lift up the Iron to the Loadſtone, when it is ſo near, that the ſideway Pillars do not interrupt it.

Whether the Corpuſcles, if they be Plaits, and prevent the Æther from paſſing can be put into ſuch a Poſition, by ſome Motion in the Æther, that by the Æther's pervading them in one Direction, it may form their Poles, make a Point ſtand upright; and whether its Corpuſcles, by Friction, enter into the Pores of the Iron Pins, and they fill the Pores of the Needle on the Outſide, or alſo on the Inſide; and whether a Point ſo filled, that the Æther cannot pervade it, will not turn North and South, if the Stream paſs that Way? Whether any other Figure of Threads, or Tubes or, &c. would have the ſame Effect?

If the Earth, or a Loadſtone, be impervadable from Pole to Pole by the Æther, or it does not pervade in that Direction, and it pervade in all other Parts, and moſt at the Equator, where it is thinneſt or moſt agitated, and ſo in Proportion; and alſo, the ſide Pillars having not ſo much of the Earth to paſs, to come at the Line nearer the Poles, how that will direct the Needle, or if the Direction is all that Way.

Conſider, the Lines that the Sides of the outer Shell make to the Place where the Needle is, conjoyntly with the Interruption given by the inner Globe, and ſee if the ſaid Sides do not alſo interrupt in thoſe Lines. For Example, If the Needle be within 20 Degrees of the Pole; then the Shell to and beyond the Pole, on one Side, and each other Way, on each other Side, interrupts in Lines, and the inner Globe in one Line. But this would be the ſame in any Part, if the —— do not move in certain Directions, by means of the Sun's Rotation, *&c.* Q. Whether the Sides of the Shell have any Effect upon the Loadſtone?

If a Terrella were Oval, or the Poles, the Part which makes the greateſt Reſiſtance, then the Needle will ſtand in that Line, in any Part that the Æther makes the moſt Reſiſtance.

If an Unite were placed at equal Diſtance from two Bodies of equal Size, if the one were ſolider than the other, the Unite would be puſhed to the Solider;

if one were larger than the other, and equally ſolid, the Unite would be puſhed to the Larger, and ſo if Diſtances were proportioned; but it is hard to conceive how it would reſt between the two, and ſo it is of a Needle, but the Needle is fixed at the Centre, and ſo may be adjuſted.

Q. If the Cap of the Loadſtone be Plates that it cannot pervade, and laid not edgways to the Pole?

The Æther may run that Way, and it may leave Plates on the Iron touched, and hinder the Pillar pervading, and then the Pillar below will lift the Iron. It, perhaps, pervades leaſt through Iron of any thing except the Loadſtone.

It is ſaid, Iron placed between the Stone and a Needle ſtops its Virtue; it interrupts the Pillar of the Æther.

The Poles of the Stone muſt have the greateſt Reſiſtance, as the longeſt way of the Needle or Piece of Iron.

When a Needle is hung or ballanced ſo nicely by each End, that the groſs Air has no effect upon it, then it is directed by the Reſiſtance below.

Every Line attempts to Expand and Thruſt, ſo the Needle is thruſt to that Pillar which thruſts leaſt.

Attracti-on.

A Treatiſe of magnetical Bodies and Motions, by Ridley, 1613. He alſo writ ſome Animadverſions upon *Barlow.*

All magnetical Globes have ſome Parts of their Bodies, which be alſo magnetical. (ſecondarily) which being ſeparated from their proper Globes, and no way hindered, will ſeat themſelves, or be ſeated unto the natural Situation of their particular Globes, (or one of them to the Pole or Part of the Stronger.)

I think a Loadſtone will take a little Piece of Iron further than it will take Filings, becauſe the Air takes more hold of it: But the Piece muſt not be too big, becauſe the Stone is not big enough to equal the Iron.

If the Loadſtone or Iron touched with it, ſtop the longer Pillar from above, the longer Pillar below, will preſs Iron up to the Stone; and, if it be ſo, the higher the Iron is from the Earth, the greater Weight will be preſſed up; but, perhaps, the Æther will be the thinner the higher.

A Loadſtone lifts the moſt Iron in the Figure of a Wedge, with the Head or thickeſt Edge towards it: which ſhews that the pillars of Æther, all act in the ſeveral oppoſite Directions.

Perhaps, a Loadſtone may lift more or leſs in different Degrees of Air, at different Diſtances from the Earth, &c. or through other cloſe Metal, &c.

Soft Iron will not attract the Filings of Iron after it is touched, but hard Iron will, which ſhews that it is not the Matter, but the Diſpoſition that is the Cauſe of Gravitation and Attraction.——So muſt draw a greater Weight of hardened Iron, or Steel than of ſoft.

Only the Surfaces of Iron are altered, and ſo only attractive. The Stone is through, and ſo directive. Perhaps, thin hammer'd or hardened Plates may be directive.

Loadſtones ſhould draw a greater Weight before Rain.

Will a Loadſtone placed over a Body in the Scale leſſen the Weight?

How much more will a Loadſtone draw of Iron, hung at a Beam ballanced by another Weight, than it will upward?

See when Iron is at one End of a Beam, and another Weight at the other, and they ballanced, Whither the Loadſtone will attract the Iron at the greateſt Diſtance upward or downward? If the Æther paſs more thro' the Iron, than it does through the Loadſtone, it will lift leſs than it will pull downward.

How far would a Loadſtone draw a piece of Iron in a hollow Barrel of Iron?

A hot Iron, perhaps, will attract; will the Stone attract it?

A Loadſtone will not attract, I think, when bored full of Holes or powdered.

Amber and ſuch Bodies, when hot, have the ſame Courſe through them.

If Amber attracts, if you heat a little piece, that keeps a Straw ſuſpended on the under Side, and heat a large piece hotter, and place it under the Straw, if it draw downward, the ſtronger muſt have the Straw; if not, it is, as below. Try two Loadſtones ſo.

When by Heat, Friction, or, &c. you put the Corpuſcles of this Fluid in Motion in Amber, or any Body, which has ſmall Pores, they take their Motion upward, and the Corpuſcles next below follow, and will lift up a Straw or light Body to the Amber, and expel it from the upper Side. Fuel in Fire will do the ſame, or the Fluid driving in at the Bottom or Sides, and expel any Thing from it upward, and is rarefied in, ſo comes up.

If the Return of the *Spirit* ſhould keep the Needle in the ſame Line, as the Axis of the Earth moves in, that would do nothing to determine the Points of North and South. And if ſome Corpuſcles move from the Line Northward, others muſt ſupply their Places and move Southward. Whether they can be of different Sorts ſo as to effect the different Ends of the Stone, or Needle, is not impoſſible; but I cannot conceive how that would do beyond the Line.

Virtue cannot be without Subſtance, ſo Virtue not without Subſtance, or Matter as the Loadſtone.

If the Needle be varied or turned by any Action from the Sun, it is weakeſt neareſt the Poles. Let it be its Action towards the Centre, or its Re-action towards the inner Globe.

Q. Whether the Steam that riſes out of the Abyſs, riſe in right Lines from the Centre of the inner Globe, and ſo in Lines of Lines, thro' the outer Globe or Shell? If the Dip of the Needle be always to the Centre, then there muſt be ſomething in the Rotation or turning of the ------- towards the Poles.

The Needle reſpects a Point in the inner Globe, by the ſame means as Bodies fall perpendicular to a Point in the whole

Globe, *viz.* By the conjoyned Force of the ſeveral Pillars of the Æther.

If the Needle reſpects the Point, or rather Line, in, or through the inner Globe, through which there is the leaſt Æther paſſes, and that Globe be formed with divers Prominences, then there may be the the longeſt Line of Matter over theſe Prominences in ſeveral Parts of that Globe; and when a Needle is placed on the Surface of this Shell, over or in the Line of one of theſe Prominences, will it vary the moſt from the Meridian, or *&c.* or will it alter its dipping?

If the Needle regard the Poles of the inner Globe, then it will ſtand uncertain at a great Diſtance from each Pole of the Outer, and will dip according to the Line of Lines, by Reaſon of its Diſtance, and equally, except one End of it be nearer one Pole than the other.

The Needle points at the greateſt Line of Obſtruction, which makes it, when it is on one Side of Equator of a Terrella point inclining to the oppoſite Pole; and perhaps the Needle does ſo towards the Earth.

Suppoſe the Earth or inner Globe, or a Terrella, longer from Pole to Pole, or more difficult to be pervaded that way than another.

Suppoſe the Stones that are formed on this Side the Line, have the—Parts of their Corpuſcles turned one Way, and the Stones formed beyond the Line have their Parts turned the other Way, or to the South Pole, ſo that theſe Stones which are found on the North Side of the Pole, work with their North End, and thoſe found on the South Side, work only with their South End; and that the Needles touched with each of theſe Stones had the ſame Effects, how will that determine which End ſhall regard the Pole, when the Needle is ſhifted over the Line?

If the Needle regards the Line that obſtructs moſt, and there be two Lines which obſtruct equally, or nearly ſo; how will the Needle point then, as ſuppoſe the Line in the outer Shell, and the Line in the inner Globe? Nay, this may be in a threefold Power, as between the Shell, this Way and that Way, and between the Line in which the inner Globe obſtructs moſt.

A Loadſtone drawing a Needle out of the polar Meridian of the Magnet, does only interrupt the Æther in that Line, and the Æther from each Side puſhes it thither, where it meets with leaſt Reſiſtance.

Putting away the contrary End muſt be performed in the ſame Manner, as both Ends are equal at a Diſtance.

Try whether two Loadſtones will keep a Needle ſteady between them, in Proportion to their Diſtances and Strength; if ſo, then two Points of the inner Globe may do the ſame.

I do not underſtand how the Poles of the Stone affect the oppoſite Ends of the Needle, that the South End of the Needle varies as much to the Eaſt, and as the North End does to the Weſt, from the North Pole.

If the Surfaces of two Loadſtones poliſhed were put together of equal Force, I think, a Needle would ſtand upright all along the Diviſion, and, I think, that is the Caſe in Mr. *Whiſton*'s Stone, it is formed in Layers like a Slate, and there is a Fiſſure where the Needle ſtands upright in a Line, and upon the Edge it turns down; ſo if two Edges of Stones of equal Force it would ſtand upright.

The two Pillars which paſs by the Stone, ſet the Needle horizontal at a proper Diſtance.

Where the Air or Æther has any Motion greater than the Æther, which guides or directs it, the Needle will not ſtand.

Depth of the Sea removes the Needle to a greater Diſtance, or the Needle dips or ſtands in the Line, where the oppoſite Pillar is moſt interrupted.

Ridley, p. 100.

The End that points to the Pole turns downward.

Barlow, 56.

If the Point were fixed to a horizontal Needle, and the Socket were fixed in the Standard, from the Bottom of the Box, would it not work better?

The dipping Needle might be fixed between two Pins, iſſuing from the Inſides of a Slit in a Ball, which Ball might turn upon a Pin: So it might elevate upon the two Pins, and vary Eaſt or Weſt with the Ball. Eaſt and Weſt it ſtands perpendicular, and enclines gradually to its true Dip, as it is turned to the North.

And, I think, they ſay, its Dip is in proportion to the Line of Chords, from the magnetick Equator to its Pole; and that the Variation or different Direction of the great Circles of Latitude, from thoſe of the magnetick Pole, will ſhew the Longitude.

Variation,

The Sphere of Water between the Globe and Shell is, 'tis likely the Occaſion of the curved Lines in the Needle's Variation. The Pillars paſs through more there than through the Globe, and, perhaps,

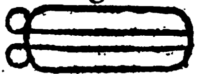
haps, between the Globe and the Shell more than through either.

Conſider what the ſide Lines of the Æther can ſtrike upon, or be interrupted more in one part of the Surface than another, which may affect the Variation.

Mr. *Norman* calls the Points, the Needle points to, the reſpective Points.

Conſider the Figure I ſuppoſe the inner Globe is of, and draw Lines as they will paſs by its Sides, or thro' its ſhorteſt Sides, and Lines alſo to paſs by the Sides of this Shell, and conſider the two Powers, and ſee how they may direct.

Could it be poſſible, that the Surface of the inner Globe could contract and ſplit, and form Veins from Pole to Pole, and that thoſe Veins, are the occaſion of Variation?

If the inner Globe be longer towards the Poles, and ſhaped ſo  that there be two Lines, which make the greateſt reſiſtance; the Needle horizontally placed, may ſometimes halt between two, ſometimes incline as it approaches neareſt towards the one, ſometimes towards the other, and the Dip at each Pole, wou'd be in a Circle.

Q. All the Stones give the directive Power to Needles?

Q.

Q. If each give the ſame attractive Power to Iron?

Ridley, *p.* 144. He makes the inclinatory Needle ſubject to Variation.

I doubt very much, whether Mr. *Wh*— will find the Lines of each equal Dip, ſtreight and parallel, where the Variation is great, and little in a ſhort Compaſs. He makes the Variation from the ſtrength of different parts of the Stone, but moſtly *Weſtward*, ſays it affects not the dipping Needle. The Variation may not be ſo great at main Sea, becauſe the Pillars of Æther may ſtrike ſideways through the Water.

Q. If the Needle varies *Weſtward* by the Rotation of the Æther in particular Places, by breaks of that Rotation by Mountains; none for a long way in the great broad Ocean, where there were no ſuch Breaks.

The Maſſes which preſs in continually from the Poles of the Earth, where they are groſſeſt, to the Æquator, where the Air is thinneſt, turn the Atoms of the Loadſtone flat.

Who would have thought or imagined, that the uſe of a ſmall Stone contrived for the benefit of Mankind, ſhould have been produced as an Evidence, to deſtroy the validity of Revelation?

If there had not been that due proportion among Atoms, that theſe of the ſmalleſt ſize, or ſmall Grains of them could have paſſed between the Atoms of Solids in Concretes, it would have driven all Solids together, as well as Loadſtones and Iron.

Iron moves into a Focus.

Unites being Solid, when they are plac'd one near another, they are preſſed againſt each other, with all the Force of the Firmament, and in proportion to the Dimenſion and Streighneſs of their Surfaces, they adhere with greater Strength.

Bodies which are compoſed of Unites, and have intervals through which the Air paſſes, and oppoſes their approach to each other, are only preſſed to each other, with the remaining force of the Expanſion and in proportion to the ſizes and numbers of the Unites they are compos'd of.

The Shemoſh muſt have a ſloping Motion to each Pole, and the Spirit muſt come into that Line, more than it does in the Equator, which muſt determine the Needle.

If Spirit do not pervade Loadſtone, what wonder that ſuch a Preſſure brings them together?

Texts concerning the Loadſtone.

Job 28, 18. *The attraction of wiſdom,* (חכמה) *is greater than that of Loadſtones.*

Prov. 3, 15. *Wiſdom is more* (יקרה) *precious than Loadſtones.*

——8, 11. *For wiſdom is* (טובה) *better than Loadſtones.*

——20, 15. *There is Gold, and a multitude of Loadſtones, but the perfection of* (יקר) *Preciouſneſs,* Valuableneſs, (are) *the Lips of Knowledge.*

——31, 10. *A Woman of* (חיל) *Virtue who can find? her value is far above Loadſtones.*

Sam. 4, 7. *Their Subſtance was more* (אדמו) *fleſh-colour'd than Loadſtones.*

Iſ. 28, 16. Q.

Job 28, 2. *Iron ſhall be taken out of the Earth, and the Stone,* יצוק נחושה.

Prov. 27, 17. (As) *Iron will be united to Iron, ſo will a Man be united to his Friend.* N. B. יחד פני.

Jer. 15, 12. *Will Iron break the Order of the Air, to Iron from the North, and to* (נחשת) *Steel?* Q. Will any Metal ſtop the Spirit, and break the Order and Direction of its Motion, but Iron and Steel? If none will in any great Degree, I think this will determine what Metal נחש is.

Job 20, 24. Pſ. 18, 35. *Bows of Steel.* Q. Could they make Bows of Braſs. 2 *Sam.* 22, 35.

Eze. 27, 19. Dan *and* Javan *dealt in* (עשות) *wrought Iron*,——*v.* 22. *The Merchants of* Sheba *and* Rahamah [from which Places the beſt Loadſtones come to this Day] *Trading*, בכל אבן יקרה.

——1, 7. *Shining as an Eye* (כעין) [that which repreſents objects] *of ſmooth poliſht* נחש Dan. 10, 6.

——40, 3. *His Countenance* (Chriſt's) *like the appearance of* נחש.

1 Kings 7, 16. *The Pillars of* מצק נחש, this Attribute does not belong to Braſs, ſo properly as it does to Steel.

On the inner Globe.

IF the Earth ſtood ſtill at firſt, the Light from the Sun, wou'd expand againſt its Surface, or expand the Water, and ſhift the Globe within, and give it Motion.

If there was a ſmall Globe at the Centre not diſſolved, and the Water that went down out of the Strata had form'd a Sphere, when the Rubbiſh went down, it wou'd ſink down to that Globe.

Atoms wou'd meet and form a Shell

about the Centre, by the Laws of—— ſo a Goodes, &c.

If a ſolid Centre were hung in a boiling Veſſel with Sand in it, a Nodule wou'd in time be form'd; ſo in the Kidneys, Bladder, gall Bladder, &c.

If the Globe within was not beat to Sand, or ſmaller at its firſt going in, it muſt be beat, or diſſolv'd at its coming out.

There wou'd as much ſmall Matter go in with the Rubble into the Abyſs, as wou'd fill up the Interſtices, and if not make it Unite and be Solid, at leaſt, make it a very cloſe Maſs.

The ſmall Matter which ſettled out of the Sphere of Water within, wou'd form a Shell about the inner Globe, if hard, as hard as can be; if ſoft, went down ſoft; and laſt, perhaps.

If the inner Globe, nay, even the Strata, had not been diſſolv'd to the bottom, too much Gravitation had ſubſiſted to have ſuffer'd the *Nodules to have been form'd; at leaſt, all was diſſolv'd below, as far as we can ſee*, or elſe there wou'd have been remains viſible: Shells could not have been ſuſpended.

After the Globe within was form'd, ſomething of what I mean by Attraction remain'd, and works now conjointly with

Gravity; and near above the Surface, is call'd lateral Preſſure, or Compreſſure of the Atmoſphere, but not ſufficient to direct the Motion of a Body in any other Line, than towards the Centre, except in ſome few Caſes.

The Earth moving in the Ecliptic, and varying from the courſe the Æther moves in, or puſhes in, muſt be owing to the Globe within, or the Moon, or ſomething that is ſo pois'd or moves.

Cou'd the Figure of the Globe within, be form'd by the Motion of the Earth, or Attraction of the Moon, or any other Cauſe, but the Apertures to vary its Poles?

Can the Water being frozen at the Poles, alter any thing?

The Apertures in the wide Sea, cannot iſſue Water enough, to make any ſhew of their flowing, by the Motion of the inner Globe, or by Attraction out of the Abyſs.

If the Sea were leſs before the Flood, the Globe which fill'd up the Abyſs, and went out of it, was leſs.

What effect this Globe can have on the Motion, or Rotation of the Earth; Fermentation, there; raiſing of Springs, Motion of the Tides, *&c.*----deſerves conſideration.

If there was Tides at the Flood, cou'd they affect the ſhifting of the Water with the Matter in it, ſo as to form different ſorts of Strata, or thoſe ſeveral ſets, from thin to thick?

They pretend the Water is attracted by the Moon, and forms the Tides. I think it is capable of being attracted very little, becauſe the Æther pervades it. If the Moon occaſions Tides, 'tis becauſe the other parts which are not under the Moon, are more preſs'd by the Æther.

But if there be a Globe within, that may be driven nearer the Moon, and cauſe the Water to iſſue on one ſide at the Fiſſures, and come in at the other Fiſſures, at the part it left, and that may have ſome Effect upon the Vapours and Springs, and it may iſſue the Waters in proportion to the wideneſs of the Apertures, and then they will, tho' guided in the Point of Time, yet riſe to different Heights, and differ in Points of Time upon the Surface, according to the Wideneſs of, or nearneſs to the Fiſſures, and ſtill be ſomething influenced by the Coaſts.

I think there is no Tide in the *Mediterranean*; does the Sea not ſupply its Apertures to a Level? or can it not have

Water to riſe from other Seas becauſe narrow?

Q. If Hail is not form'd largeſt when the Moon is near, or perpendicular over a Cloud in froſty Weather, and falls when it goes further off: and ſo of Rain?

I think the Rarefaction occaſioned by the Beams of the Sun ſhorten the Pillar, or weakens it, ſo that the Æther on the oppoſite Side puſhes the Earth, and perhaps the inner Globe by that continually ſhifting the Centre, occaſions the Motion.

The different Continuance of the Light in the Cap, has the ſame Effect upon the inner Globe, as it has on the Shell.

The Force of this thinned Æther muſt have the ſame Effect upon the inner Globe, as it has on the Shell, it muſt enter into the Sphere of Water, or the middle or hindmoſt Side, and drive the Globe a little forward in that Direction, and the Puſh behind muſt take more Hold of the ſolideſt Part, and the Foreſide of the Pillar of Darkneſs, muſt reſiſt or preſs on the Foreſide, which will then have moſt ſolid Matter in it, and turn to the Sun, and ſo ſucceſſively.

If the Waters can be thinn'd by Heat ſo as the Globe approach nearer, or can be impelled further off by the Sun: Conſider the Effect upon the Account of Rotation.

If the Water in the Sphere between the Shell and the inner Globe, can be thinn'd by the Æther on the Side next the Sun ſucceſſively, it may have the ſame Effect upon it, as the Æther has upon the outward Shell, and make it approach ſtill nearer the Shell on that Side, without forcing the Water out at the Apertures.

Where the Parts of Light paſs one way, thoſe groſſer muſt ſucceed either in that or in ſome other Line, and if ſome fine Fluid were to pervade the Loadſtone, the Air, *&c.* it takes place of, muſt revert on the Outſides of the Stone thither. But all is, how the Light pervades to the inner Globe, and in what Lines, and in what Form, and with what Company it iſſues out.

The Light which paſſes from the Sun to the inner Globe, may be all Night in riſing, and ſo continually from each Side.

If the Globe within be ſolid, which will move forward faſter than the Shell, do either preſs to the Side next the Sun, or to the Side that makes forward in a Line, it may perhaps do ſomething towards raiſing Rain, Springs, *&c.* thro' the Strata; but then that wou'd raiſe the Water out at the Apertures.

Whether the two points of hardeſt Preſſure, can make the Æther in the Sphere of Water riſe in Lines from the Surface of the Globe, as the Needle dips, and be varied from the Mountains on that Globe, or the Dipping and Variation be both from the oblong Figure and Mountains on that Globe.

Whether the Mountains or Inequalities on the ſurface of the inner Globe, or on the concave ſide of this Shell, can make any Ruffle in the Water by the Earth's Motion, and ſo raiſe Steam variouſly as it ſhifts: If ſo, the Variation wou'd aſcertain the Rains.

Conſider the infinitely greater Preſſure upon, and conſequently the vaſt difference in Weight, between the ſame Quantity of Water or other Matter near the ſurface of the inner Globe, and that at a great Diſtance, and the ſmall Degree of weight, Water will have near the inner ſurface of the Shell, and up the ſhell, till it be near through, and ſtill how much leſs as it goes greater Diſtances from the upper ſurface of the Shell into the Atmoſphere, and what Effects that will have upon the

Waters riſing, and upon the cloſeneſs and ſolidity of the inner Globe, as Iron is preſſed ſtronglier the nearer it comes to the Loadſtone.

The infinite Force of Gravity, is vaſtly abated by the Recedence of Corpuſcles from the inner Globe, and by its Diſtance from the ſurface.

The Needle is directed by the ſmall Æther to the inner Globe, but that which gives Bodies their perpendicular Direction is larger and ſtronger.

But the Needle is directed or puſhed by the Æther, which aſcends on every ſide of the Point, where leaſt aſcends, to that Point, and reſts there.

FINIS.

An ENQUIRY towards a Conſtruction, Delineation, and Deſcription of the Symbols of the Syſtem of this World, and of the Fluid Powers, Subſtances, Motions, and Courſes in it, which were inter al. given in Writing by God to *David*, and from him to *Solomon*, wrought by *Hiram*, and ſet upon two Supporters before the Entry into the firſt Temple of GOD built by *Solomon*.

I HAVE hinted in my *Introduction* to, and in ſeveral Parts of my *Second Part of* Moſes'*s Principia*, ſhewed what Uſe the Antients made of Symbols, and that the mute Symbols of the Powers of Motion, *&c.* of the Heavens or Airs, and the Courſes of the Orbs, *&c.* which had been placed in Parts before, or in the Temple to thoſe Powers of the Airs, and ſo attributed to them; were ordered to be placed in or before the Tabernacle or Temple of God, and ſo attribute thoſe Powers to their Creator and Former. It would require no ſhort Time to go through each Particular.

I chooſe to begin with this, which was placed Part upon a Supporter on one Side, and Part upon a Supporter on the other Side, in the Court before or under the Porch or Entering into the Temple. Nothing leſs than All could be attributed to, or be in a Symbol of the Power of God, who was ſerved there: This is the moſt plain, and by its Station before the Temple is firſt.

Thoſe who ſaw theſe Works formed from the Patterns underſtood them; but as theſe Works were deſtroyed for their Faults, it may be ſuſpected that it was not intended that their Poſterity in future Ages ſhould have any other than a general Idea of them.

Though I am ſenſible, that the Deſcription in Words was not wrote to convey perfect Ideas of them longer than while they were permitted to ſtand for that Race: Yet as the Parts were taken from the Temples of the ſeveral Powers the Heathens worſhipped before this, and as theſe Parts have been uſed there ſince, I ſhall at leaſt endeavour to give general

Ideas of them; and if we, tho' deſcended from Heathens, be real Chriſtians, perhaps it may be permitted that we may have a particular, or exact Idea of them.

And this Rule is always to be obſerved, that we muſt take the emblematical Attributes the Heathens gave to the Heavens in *their* Senſe, and thoſe the Prophets attributed to God, in *their* Senſe.

Many have wrote to ſet forth the Magnificence of the Temple of *Solomon*, none, that I know of, have ſo much as attempted to ſhew the Deſign of its Parts, or what they call its Ornaments.

The *Chaldee Jews*, or thoſe who deſcended from *thoſe* who were Captives there, have, as I have ſhewed, given others no true Account of any of theſe Things: Thoſe who had ſeen them have given us none, and thoſe who had not ſeen them, nor ſeen any Accounts of them that they tell us of, but had only heard by Tradition of them, (whether through Ignorance, or purpoſely, they beſt knew) laboured to give Ideas of them quite foreign to the Purpoſe; and hitherto all Nations have conſented to be deceived.

Theſe two Columns in particular, tho' they were of caſt Metal, have been taken as Pieces of Architecture. And *Caſtel* before his *Polyglot* has given us Deſcriptions from ſundry of the Proportions and Symmetry of theſe Columns, and their Ornaments ſo learnedly, that 'tis enough to turn one's Head to know what they meant by them.

The ſuppoſed Perfection there was in theſe Figures, and the Miſtakes in the Conſtruction of their Parts, has given Birth to an Order of Men, who have taken the Name of Architects, *viz.* the Builders of Houſes for Churches, Palaces, and Habitations, who by a few Names of Columns, Chapiters, and Orders ignorantly ſtole from Scriptures, and antient Heathen Writings, fill the Heads, and empty the Pockets of our great Men, and puzzle the World without knowing either of what Figures they were, or what they repreſented, any more than the Race of philoſophical Architects know of the Powers, and Motions they were Types of in this Syſtem, or of what is in their infinite Number of other imaginary Syſtems.

As the Tabernacle and Temple each and both, and every particular Figure or Thing pertaining to them were made to the ſame general Purpoſe; I am firſt to ſhew, that there were Deſigns given from him to make the Emblems, who made the Things, Powers, Motions, and Courſes they repreſented. —— Exod. xxv. 8. *And let them make me a Sanctuary, that I may dwell among them.* v. 9. *According to all that I ſhall ſhew thee, after the Pattern of the Tabernacle, and after the Pattern of all the Inſtruments thereof, even ſo ſhall ye make it.* v. 40. *And look that thou make them after the Pattern, which was ſhewed thee in the Mount.*

Acts vii. 44. *Our Fathers had the Tabernacle of Witneſs in the Wilderneſs as he had appointed ſpeaking unto* Moſes, *that he ſhould make it according to the Faſhion which he had ſeen.*

Heb. viii. 4. *Seeing there are Prieſts that offer Gifts according to the Law.* — v. 5. *Who ſerve unto the Example and Shadow of heavenly Things, as* Moſes *was admoniſhed of God, when he was about to make the Tabernacle: For ſee, ſaith he, that thou make all Things according to the Pattern ſhewed thee in the Mount.* ibid. ix. 23. *The Patterns of Things in the Heavens. Moſes* had People enow with him, not only of the *Jews*, but thoſe Heathens of other Nations, who, convinced by the Miracles he had ſhewed, followed him, who had ſeen the Temples, Tabernacles, Symbols, or Hieroglyphicks of the ſeveral

Heathen Countries they had dwelt in, who were able to work by his Directions according to the Patterns he had ſeen.

2 Sam. vii. 4. *The Word of the Lord came to* Nathan, *ſaying,* v. 5. *Go and tell my Servant* David,—— v. 12. *When the Days be fulfilled, I will ſet up thy Seed after thee.* — v. 13. *He ſhall build an Houſe for my Name.*

1 Chron. xvii. ibid. xxviii. 10. *Take Heed now, for the Lord hath choſen thee to build an Houſe for the Sanctuary; be ſtrong and do it.* v. 11. *Then* David *gave to* Solomon *his Son the* בנה *Pattern of the Porch, and of the Houſe thereof.* — v. 12. *and the Pattern of all that he had by the Spirit, of the Courts.* — v. 19. *All this, ſaid* David, *the Lord made me underſtand in Writing by his Hand upon me, even all the Works of this Pattern.*

The Parts of the Tabernacle, and the Deſigns in them, which eſcaped being carried away and loſt, and which were made of corruptible Matter, were at the Time of the building of the Temple moſt of them defaced or periſhed; and the *Iſraelites* or the Children of Converts who had lived there, tho' ſome of them had ſet up Images, &c. had not ſeen or helped to make any ſuch magnificent and perfect

Repreſentations as were in the Pattern, perhaps more particularly the Spheres. — And tho' as *Solomon*, and *Huram*, both after mention, *David* had in his Time provided cunning Men for the Performance of the Work in, and about the Temple, yet *Solomon* either thought or found them inſufficient. And notwithſtanding what has been ſaid and paſſed current of *Egypt*, it appears that *Tyre*, in *Ezek.* xxvii. *&c.* was the chief Port or Mart whither all ſorts of Materials were carried or fetched, and where they were manufactured, caſt or wrought, and from whence they were carried or exported, which was then the Cauſe aſſigned for its predicted Deſtruction.

And as it will appear, that *Hiram* (who was a Jew by the Mother's ſide) had been employed under *Huram*, the King of *Tyre*, by which it appears, that in thoſe days the Kings were Surveyors of the Temples, Imagery, *&c.* of their reſpective Gods, and that he by being employed among the Heathen, had been taught or acquired by Experience the Skill of framing Symbols from the Plan given to *David*: This implies ſtrongly that he had been uſed to make ſuch Symbols at *Tyre*.

2. Chron. ii. 3. *And* Solomon *ſent to* Huram *King of* Tyre, *ſaying*, v. 4. *Behold I build an Houſe to the Name of the Lord my God to dedicate it to him*, &c. v. 5. *And the Houſe which I build is great, for great is our God above all Gods.* v. 6. *But who is able to build him an Houſe? Seeing the Heaven, and Heaven of Heavens cannot ſuſtain him? Who am I then that I ſhould build him an Houſe? Save only to burn Sacrifice before him*, v. 7. *Send me now therefore a Man cunning to work in Gold and in Silver, and in Braſs, and in Iron, and in Purple and Crimſon, and Blue, and that can ſkill to grave with the cunning Men that are with me in* Judah, *and* Jeruſalem, *whom* David *my Father did provide.* — v. 11. *Then* Huram *the King of* Tyre *anſwered in Writing which he ſent to* Solomon, v. 13. *And now I have ſent a cunning Man (endued with Underſtanding) of* Huram *my Father*. v. 14. *And his Father was a Man of* Tyre, *ſkilful to work in Gold, and in Silver, in Braſs, in Iron, in Stone, and in Timber, in Purple, and Blue, and in Linnen, and in Crimſon; alſo to grave any manner of Graving, and to find out every Device which ſhall be put to him, with thy* כון *cunning Men, and with the cunning Men of my Lord* David *thy Father*.

1 Kings vii. 13. *And* Solomon *ſent, and fetched* Hiram *out of* Tyre, v. 14. *He was a Widow's Son of the Tribe of* Napthali, *and his Father was a Man of* Tyre, *a Worker in Braſs, and he was filled with Wiſdom and Underſtanding, and Cunning to work all Works in Braſs, and he came to King* Solomon, *and wrought all his Work.*

I ſhall explain a few of the Words which are not taken to come up to the Signification of the Original. *Heb.* viii. 5. *Who ſerve* (*Steph. Theſ.* t. 2. 603. λατρεύω, "to ſerve as a Servant.") *unto the Example* (*S. T.* t. ſ. c. 931. "alſo a Copy or Plan,—*Polybius* from *Plato* ſpeaking of the Creation of the World uſes the Word for an Exemplar or Model.") *and Shadow* (*S. T.* ſuch a Repreſentation as the Shadow gives of the Thing which obſtructs the Light) *of Heavenly Things* (t. 2. c. 1543, "which are in the Heavens.") Conſidered as Powers and Motions of the Airs upon themſelves, upon the Things in them, as they had been miſtaken for Gods. *Exod.* xxv. 40, *Pattern.* בנה *M.* "It is a Similitude, Figure, or Copy; Plan of a Building, Method, Type, Form." LXX. Τύπος, Type. A Deſcription or Repreſentation by Lines, Paintings, Models, or Images, particularly of thoſe Powers the Heathens called

Gods. 1 *Chron.* xxviii. 11. LXX Παράδειγμα, a Copy. 2 *Chron.* ii. 13. חכם. *M. Arab.* "Philoſophy. חכמוני *M. Cachmoni* or *Cachmonæus*, a Family Name, 1 *Chron.* xi. 11. a wiſe Man, a Teacher of Wiſdom." Thoſe ſkilled in all the Branches of the Knowledge of Nature, LXX Σόφος, a wiſe Man. What this Word alone meaned is explained at large, but may be beſt underſtood by the compound Word *Philoſopher.* ידע *Endued with* or ſkilled in, בינה *Underſtanding* (Theſe Sciences or Practices were all forbid, except upon this Occaſion) M. "Underſtanding —— the Faculty of the Mind is to be underſtood here — perceiving and diſcerning what ought to be done, and what not." — *Ibid.* 12. *Huram* gives the Epithets of חכם and שכל, and בינה to *Solomon*: *Hiram* had no Occaſion for שכל the Word applied to the Tree in Paradiſe. LXX ἐπιστήμη Knowledge, al. Φρόνησις Underſtanding, and he makes this farther Diſtinction; the Qualifications in *Solomon* were all to build the Houſe for the Lord and himſelf. The two in *Hiram* made him ſkilful to work in the ſorts of Matter mentioned, which were each employed by the Heathens in repreſenting the Actions and Conditions of the Air, and therefore were alſo to be uſed in the Temple of God. Among the reſt this נחש Braſs. *M.* " Incantation, Divination, Braſs, Serpent, Fetters." LXX. Χαλκὸς *S. T.* t. p. iv. c. 375. what the Mixture, or Colour was does not clearly appear, only we know that any Compoſition with Copper in the open Air will turn blue. And it appears both in the Hebrew and Greek, that this matter was ſo much uſed for Emblems, that it's alſo uſed for Beaſts, Birds, and Figures they uſed in Divination, and for the Act itſelf.

And he was qualified, 2 *Chr.* ii. 14. פתח (*M.* " to Engrave, Carve, or Emboſs." *&c.*) פתוח (" *Sculpture, Picture,*") to *Grave any manner of Gravings.* γλύφω — *and* חשב *to find out every* מחשב *Device. M.* " Imagination, Reaſoning, Philoſophy, LXX. διανόησις — this was to form Things from Ideas in the Brain, which had no Exiſtence before, and what the Hebrew Text calls *Imagination*, the Greeks called *Reaſoning* or *Philoſophy*, at leaſt till after Chriſt.

The ſacred Writer when ſpeaking as he was inſpired expreſſes the thing to *Hiram*, who was endowed with theſe ſorts of Knowledge, 1 *Kings* vii. 14. *to work* *all Works in Braſs, and he came to King* Solomon, *and wrought all his Work.*

The word לעשות *to work*, will make a ſhift, but מלאכה *work* ſomething better; in Latin *Opificium* will not do. What the word is you will find explained in my ſecond Part of *M. P.* p. 94. *&c.* And the LXX. by ἔργα, or ἔργον comes not much ſhort, as appears under that word *S. T.* t. ſ. c. 1227, *&c.* and 1237. "An Engine or Crane, Energy, Action. To be in Action, to work, do, perform; in *Vitruvius* it is a ſort of a Crane which ſtands upon a Baſis of its own, * and is turned round by Men puſhing againſt it with their Breaſts and Arms." And as he is ſaid to make all the מלאכת of *Solomon*, it will appear by the ſum of his Work, that he meddled with none but ſuch as were Repreſentations, and ſo called by the ſame Names as the Originals.

I hope theſe Patterns will not be taken to be like the idle Imaginations of Men, and beſides what is ſaid of the Wiſdom of *Moſes*, *David* and *Solomon*, the Experience and Skill of *Hiram*, who was only employed about ſuch Works as this, and about this in Chief, I hope it will be remembered that *Moſes*, *David*, and *Solomon* were inſpired, and ſo capable of Receiving and Underſtanding a Pattern, and of executing the Work according to the Pattern. And beſides that the Pattern of the firſt Temple infinitely exceeded that of the ſecond, which is wrote in *Ezekiel* for the Reaſons aforeſaid, the latter would come ſhort of the Pattern of the firſt Temple, becauſe thoſe who were to execute it, were not inſpired, as I hope it will be remembred, thoſe who executed the firſt, and as the ſacred Writers who deſcribe them were.

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* The working part of the Machine.

I need not labour this Point, nor load it with abundance of Evidence, but only give proper Hints to lead others into the Search of the Knowledge of the Syſtem: theſe Inſtances will draw in all Men, who ſearch after Knowledge, and are not for making it themſelves to compare the Evidence in Writing and Things, and to collect the other Evidence, which prove every Article in it.

Theſe Figures of Braſs are not to be conſidered as *Hiram*'s. If he who was the Workman had only had the Plan, and wanted *Solomon* who was inſpired to ſet him right, had made ſome ſmall Miſtakes in his Work, thoſe could not have been imputed to the Plan, which was infallibly perfect: So this Deſcription is not mine; if I who am but the Conſtruer err in ſome ſmall Points in conſtruing the Words, ſo in repreſenting the Things, I muſt bear the Blame for theſe Defects.

The Deſcriptions in the ſacred Writings were at leaſt intended to give *general* Ideas, if not to the ſmalleſt Circumſtances, and are perfect; if I come near, that is ſufficient to excite others to perfect it, at leaſt I hope this weak Performance will prevent Men from ſetting up our modern Philoſophers, and the Muſhrooms they ſprung from, nay even the eldeſt of the Heathen Writers for Inventors of Deſcriptions or Types of this Syſtem, or of the Powers, Operations, Motions or Courſes in it: And that whatever Allowance be made to the modern Heathens, that the Men who lived where there were Bibles, and who had but once ſeen in the Tranſlation, nay even heard, that the Creator of the Syſtem had given an Account or Deſcription of it, and underſtood not a word of the Language it was wrote in, or ever had attempted to learn, or conſider a Word of it, and took upon them to ridicule that Account, and ſet up Deſcriptions out of Dreams of their own, will (as long as any Memory of them is preſerved) be reputed even by the Vulgar, as the impudenteſt Creatures that ever were born.

In my Progreſs I muſt take in each relative Sentence from the ſeveral Texts where they are mentioned, becauſe ſome of the Deſcriptions are in Variety of Words, and in one or two ſeemingly different from others of the ſame Thing or Things.

I ſhall uſe the *Polyglot* interlineary Verſion, becauſe in that the Order of Words is moſt correſpondent to the *Hebrew* Text *.

1 Kings vii. 15. *And he caſt two Pillars* (Columns) *of Braſs.* v. 41. *two Pillars.* 2 Chron. iii. 15. *and He made before the Houſe two Pillars.* iv. 12. *two Pillars.* Jer. xxvii. 19. *the Pillars.* lii. 17. *Pillars of Braſs.* He firſt begins here with a Deſcription of making the Parts, or of caſting them. יצר "to faſhion or caſt." This is a Power of the Air, to which they had a Temple in *Canaan* explained in the ſecond Part of *Moſes*'s *Principia*, *p.* 328. applied to melted Metal, its compreſſing and ſo fixing the Parts. — This is applied not only to natural Things but to Fictions,

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* But the EDITORS, according to the *Propoſals*, have tranſlated the Texts into *Engliſh*.

or Repreſentations of them, LXX. Χωνεύω, *S. T. l.* 4. *c.* 480. *conflo*, that is, to melt: But the *Hebrew* Word as all the reſt is proper, preſuppoſes all the former Parts of the Action, bringing the Braſs, putting it into a Furnace, melting it, making Moulds, and letting it off into them, and is only the laſt Act of the Air binding and ſo hardening them in that Form. And the Action of this Agent, where Man ſets the Agent to work, is attributed to him: But as the Heathens knew this to be the Action of the Fire and Air, perhaps thence the molten Images were more ſacred, and this Word *caſt*, is applied to every ſubſequent Figure he made.

Two Pillars. עמד was the Name given to each of the two Appearances of Fire and Cloud in the Wilderneſs, explained in *M. Principia*, Part ſecond, *p.* 190, *& ſeq.* The Word ſignifies a *Supporter*. If theſe two be taken generally or as the firſt Order, they ſignify, as will appear by their Names hereafter, the Light going out, and the Spirit coming in, which ſupport every Thing, Action, or Motion in this Syſtem. If taken with reſpect to one moving Orb, the Light going out and the Spirit coming in, ſupport it at near the ſame Diſtance from the Centre, which is called by another Name, *the two Orders.*—If taken with reſpect to its Motion, (the Light ſtriking againſt the Orb, and the Spirit puſhing into it) the Light upon this Orb ſupports the Motion, LXX. ςύλȣς.—— If this were to be taken in the Senſe they give of the Word ςήλη, *ſtelæ. S. T. t. ſ. c.* 1805. "*Pliny* ſays the *ſtelæ* were of Stone; with unknown Characters upon them——The Columns of *Hercules* and *Bacchus*, which they ſet up in the utmoſt Parts of the World, as the Bounds and Monuments of their Labours—— Such Pillars as are in publick Buildings, as the Treaſury." If this be taken as ςύλος, 1809. Indeed *Chryſoſtom* underſtood the Word, made St. *Peter* and St. *Paul Supporters* of the Church, but they have endeavoured to hide that by a Metaphor, and they have confounded the Word into a Term of Architecture; even thoſe in the Temples, as much as thoſe Texts have been confounded. The Heathens not only uſed ſuch Columns in their Temples, to repreſent theſe Powers, but this *Number two* ſupported *Dagon*'s Temple. And *Hieroglyp. Ægyptio-græreorum, p.* 232. from ſundry, "at which places *Hercules* erected two Columns, as the Bounds of his Labours, one of which he called *Calpe*, the other *Abyle*, and he put them at the Extremities of *Lybia* and *Europe*; as *Bacchus* ſat up two Columns in the *Eaſt*;" where ſuch ſtood we ſhall ſhew in its Place.

Whether 'twas this Number, or the Convenience of ſeeing all the Parts of the Univerſe, which if whole or in one, muſt have been covered, as the Original is, with a partly opaque Caſe, I determine not; but I think it appears that a Hemiſphere, or as three to five which would take in or cover from each Pole to about the further Side of the Ecliptick of the outmoſt Caſe or Sphere with the fixed Stars, and the Sun with all the moving Orbs, their Courſes and the reſt of the Guts in it, was placed upon each oppoſite Supporter, with their Mouths open, and oppoſite to each other, ſo that every one who went in at one Station might ſee the whole in each, but more particularly the Parts of the Courſes, &c. which were leaſt viſible in the one, the moſt openly in the other.

1 Kings vii. 15. *Eighteen Cubits** *was the Height of one Column; and a Line of twelve Cubits did compaſs either of them*

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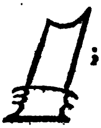
* This is taken to be the Cubit of the Sanctuary, and to contain about twenty eight of our Inches.

about. 2 Kings xxv. 17. *Eighteen Cubits was the Height of one Column.* 2 Chron. iii. 15. *Two Columns of thirty and five Foot high.* Jer. lii. 21. *The Height of one Pillar was eighteen Cubits, and a Fillet of twelve Cubits did compaſs it; and the Thickneſs thereof four Fingers, it being hollow.*

Whether theſe Numbers of twelve, twenty four, eighteen, or thirty ſix, refer to the Numbers the Heathens gave to their Signs or Horoſcopes, or thoſe Numbers of Meaſures uſed in their Columns, or that they were to be proportionably magnificent to the Parts of the Temple, or that the Figures might each of them be made ſo large that they might laſt as long as he who gave the Pattern knew the Temple would ſtand, and therefore be properly placed at that Height, where they might be more perſpicuous, where the Parts might be diſtinctly ſeen, and afford a proper Repreſentation, and a more perfect one than when the Eye approached ſo near, as to ſee the Imperfections in working.

No Doubt theſe Columns were of a proper Diameter, proportionable to their Height and to the Diameter of the Work or Shell, which was to ſtand upon each, and the Thickneſs of four Fingers was not too much to ſupport itſelf, and the vaſt Weight upon each, and againſt the Hold a ſtormy Wind muſt take of Things of ſuch a Diameter.

Whether theſe are expreſſed to be hollow, which could not have been otherwiſe moveable, to determine the vaſt Quantity of Braſs in them, or other ſmaller were made hollow to repreſent Columns of Air which ſupported the real Things, of which the Shell ſupported only the Emblems, and theſe repreſented the Supporters of the two Hemiſpheres, by the Columns of Air within, or both, is not of great Conſequence; but in the Spheres placed upon them, the Airs between each Circle repreſented the Sphere of Air, or as they called it, the Heaven in the Syſtem. There is a Difference in the Deſcriptions: Each of the Columns in three Places of Scripture are ſaid to be eighteen Cubits high, and in one Place where their Length is counted together, they are ſaid to be thirty five Cubits. As every Part of Scripture is infallibly true, no Doubt the ſeeming Differences are wrote with Deſign to excite our Attention, and if examined till they be underſtood, diſcover each ſome important Truth, which in a ſingle Deſcription we might have overlooked: Here each of the Columns muſt be of Courſe ſhorter on one Side, than on the other, and from one Side to the other concave, fitted for the under Side of each Hemiſphere, to reſt in every Part upon each of their reſpéctive Tops in this Figure ; ſo that if they had been laid on the Ground, and each longer Side joined to each ſhorter Side, it may be demonſtrated, that together they could make but thirty five Cubits, a Cubit ſhorter than each meaſured to the Height, and the Meaſures put together would make.

As I have in general laid down, that every Thing about the Temple was in Oppoſition, or to reclaim the Sovereignty of thoſe Powers, attributed by the Heathens to the Heavens, before I proceed; beſides what I have ſaid about theſe two Supporters, it is proper to ſhew, that they had ſomething upon the Heads of Supporters, before the Entries or Doors of their Temples. Amos ix. 1. *Smite* הכפתור *the Sphere, and let* הספים *the Poſts ſhake. M.* כפתר "a Globe, Sphere." *C.* Of which Sort they adorned the Pinnacles of their Temples and other grand Buildings with." This *Hebrew* Word is only uſed for the ſix Parts upon the Branches of the Candleſtick, which they call Knops, in this and one other Place upon this Occaſion. 'Tis a compound Word of כפף and חר or חור. The Word כפף *M.* "Curve, Bend." *&c.* *Jer.* lii. 18, 19. as we now uſe it *Cap*, *Cup*, Part of a Sphere or Circle. *Job* xxxvi. 32. it is uſed for the Hemiſphere or whole Sphere; and חר is an Attribute, as ſhewed in my ſecond Part of *M. P. p.* 503. a Leader or Driver of the Orbs in Spheres or crooked Lines:—In this Place the Emblems of thoſe Powers, Actions, and Courſes. ספים *Poſts* *M.* is always uſed for an hollow Veſſel, or for a Porch; tho' variouſly tranſlated, Poſts, a Threſhold, *&c.* and ought to be here an hollow Shell or Covering above the Door and before the Porch. Iſai. vi. 4. *and* אמות *of* הספים *moved.* LXX. Υπέρθυρον, "Lintel of the Door." This Word (אמות) is but this once uſed under this Senſe. *M.* "It ſignifies Motherhood, "Miſtreſs of the Family, a Cubit." This is ſome general Name, as the Heavens was Mother of the Gods. *Rabb.* אמום *a Type.*—That theſe were to theſe Uſes, *Ezek.* xliii. 8. *in ſetting* ספם *their Shell by my Shell, and* מזוחם *their Poſt by my Poſt, and* הקיר *a Wall between me and them, and have defiled my holy Name by* תועבותם

their Abominations that they have committed: wherefore I have conſumed them in mine Anger.—In theſe Parts of the Candleſticks כפתר. LXX. σφαιρωτὴρ. *S. T. t.* 3. *c.* 1160. " σφαίρα, *Sphæra*, a Sphere or Circle. 1161. σφαιροειδὴς. Since Heaven is found—like a Sphere or Ball. 1162. σφαιρικὸς, *ſpherical*, what Things are ſeen and known to be in a Sphere." Hence the Heathens had their Play with Spheres, and Places to play in, which was one of their *Olympick* Games. In this Text, *Amos* ix. 1. the LXX. have uſed ἱλαστήριον, *Propitiatorium*, or Mercy-ſeat, which is the Word for כפר, and is a wilful Miſtake, not intending to ſhew what it was, but that it was ſome Emblem of their Religion, which being ſo placed would make the Heavens propitious. In the only remaining Place where כפתר is uſed, *Zep.* ii. 14. *The Cormorant and the Bittern ſhall lodge in* כפתריה *the Spheres thereof; their Voice ſhall ſing in* הלון *the Hollow; Deſolation ſhall be in* סף *the Shell, for the Cedar ſhall be uncovered.* LXX. Φάτνωμα. The Lexicons give us no Idea of this Word except *Ceiling*, and they uſe the ſame Word for סף and ספן; they were ſome Things which conſiſted of Cieling, Arches, Circles, *&c.* and were ſomething more than a ſolid Sphere or Globe, becauſe Bitterns, *&c.* could build within it. *Amos* ix. 1. סף LXX. Πρόπυλον, *Veſtibulum*, Porch, *S. T. t.* 3. *c.* 612. "which is before the Door; a Place between the Door and the Road. *Pollux* — The Entrance of the Temple." *Ezek.* xliii. 8. LXX. Πρόφυρον, *S. T. t. ſ. c.* 1615. which is before the Gate, the Porch — *On the Porch of the Temple*, S. T. *Veſtibulum* is ſo called, says *Servius*, either becauſe *Januam veſtiat*, as we ſee a Room ſupported by two Columns, *&c.*" Whatever מזוזתם *Poſts* ſignifies, it's very likely ſome Things were done there by the Heathens, becauſe the *Iſraelites* were to daſh the Blood upon them: In their private Houſes they were to write upon them *. Thoſe in the Temple were to be of ſuch a Species of their ſacred Trees, of ſuch a Figure, *&c.* of which more under the reſpective Words in the Text.

1 Kings 7. 16. *And he made two* כתרות *to put upon the Heads of the Columns, of molten Braſs.* 2 Kings xxv. 17. *and* כתרת *upon it of Braſs.*

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* See *Exod.* xii. 7. §. xxi. 6. *Deut.* xi. 20. *Prov.* viii. 34. *Iſ.* vi. 4.

Before I proceed I am to obſerve, the Emblems I am going to explain are moſtly of two Sorts; firſt the Agents or efficient Cauſes and their Courſes, under the Names of Columns, Orders, *&c.* ſecondly, the Courſes or Circles the paſſive Orbs are placed and moved in, which are as one may term them the Effects.

כתר *M.* " It ſignifies a Crown, Compaſs, Circuit; as a *Verb*, to go round, encircle, *&c.* *Chaldee*, the ſame; *Syriack*, Daily; *Rabb.* The chief Property of the divine Name. *B. C.* iiii. כותריתא a Palm, Chapiter, Tops reſembling Crowns, or ſomething round*. LXX. Ἐπίθημα. *S. T. t.* 3. *c.* 1474. " Θῆμα is ſaid to ſignify alſo the Planet of one's Nativity, and Horoſcope, that is, an Inſtrument which the Mathematicians make uſe of to obſerve how the Heavens ſtand affected, and the Stars are ſituated at one's Birth, *&c.* *Vitr.*

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* *Boderino Lex Syr. Chald.* " Hence כתרא a Crown, Diadem, Chaplet: *Iſai.* xxviii. in the Plural, כתרין Crowns. *Deut.* xxxi. and כתר in their more ſecret Books, is the utmoſt Meaſure or Property of the divine Name אהיה which flows into nine inferior Numbers. In the Gates of Light, in the Gates of Righteouſneſs, *Tikum Hazoker*, and the like, כתריא alſo are Ribbands, Garlands, *Iſai.* iii. and כותרתא *the Figure of a Palm.* Ezek. xl. *Kimchi*, Chapiters. *R. Sebel*, Spheres.

lib. i. cap. 2. *Decor perficitur Statione*, &c. " Beauty is perfected by *Station*, which in *Greek* is called θεματισμὸς; or by Cuſtom or Nature; by Station, when Buildings are ſet up in the open Air to *Jupiter*, Thunder, and Heaven, and to the Sun and Moon."

S. T. ibid. " The Lintel or upper Door Poſt. 1478. εὐθημοσύνη, when every Thing is put in its proper Place; and diſpoſed or ſorted in Order neatly and exactly. *Heſiod* 1481. ἀνατίθημι *Bud.* to hang up, or fix up an Image. *Plut. in Themiſtoc. Demoſt.* The *Latins* ſometimes ſay *to ſet up*, (ſtatuere) and ſometimes *to fix up* (figere) Trophies. *Herod.* to dedicate or conſecrate in the Temple of *Juno.* 1483. ἀνάθημα, a Gift which is dedicated or conſecrated —— Ornaments in Temples, they are, ſays *Macrobius*, Shields, Crowns, and ſuch Sorts of Gifts, nor are they dedicated when the Temples are conſecrated at firſt —— but ἀναθήματα are properly thoſe Gifts, which being dedicated to the Gods, were hung upon the Walls and Columns of the Temple; or hung down from the Roof *.

1497.

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* The Reader will excuſe the *Editors* for obſerving, that what is rendered 1 *Sam.* xxi. 9. *The Sword of* Goliath [גלית the Taker of Captives] *wrapt in a Cloth*,

1497. ἐπιτίθημι to devote or conſecrate himſelf to the infernal Deities. ἐπιτίθημαι, as *(Lorica)* a Parapet or Penthouſe is built againſt the Tops of Buildings and of Walls." Ἐπίθημα, "That which is put upon a Thing, or ſet againſt it, a Cover." *Pauſan. in Achaicis*, "an armed Man was put upon a Monument; and again, even to my Time there ſtood a Column which was placed over a Tomb. —— It is alſo a Cover or Lid." ἐπίθεμα, the ſame as ἐπίθημα, a Statue, Column, or ſome ſuch Thing which is placed upon the Tombs of the Dead; or erected, or inſtead of a Cover." *Pauſanias*, a Cover or Lid, which any Thing is covered over with," when celeſtial Powers were attributed to the Figure of Man, or to real Man, by putting ſuch a Symbol upon his Head, as *ιστου ϖεριτίθημα*. "*Herodian of the Calends of January*, Book I. —— They put on a fine *Prætexta*

Cloth, ſhould have been, the Sword hanging or pendant by the Spoils, the Armour of *Goliath* as a Trophy in the Tabernacle at *Nob*. לט rendered *to wrap up*, is to hang like a Drop, pendulous; and is uſed for one of the Gums or Diſtillations uſed in the ſacred Ointment, or rich Perfumes they made their ſweet Odours with; and ſo *Jer*. xliii. 9. מלט מלבן is not the Clay of a Brickiln at the Door of the Palace of a King, but an *Incenſe Altar* in (perhaps) a Portico built of white Bricks, as *Babel* was.

Prætexta (a white Robe with a Facing of Purple upon it) for the Year; and Book VI. and put a Crown about them, or even put one upon them." *Ibid.* *Ariſtotle of the World*, "Another having braſen Feet puts an Helmet upon his Head, and a Girdle upon his Loins — and in *Xenophon*, who put a Chain round his Neck; *Torquatus*, one wearing a Collar or Chain, *&c.*"

1 Kings vii. 30. Κεφαλίς, (*Cephalis*) *S. T. t.* 2, *c.* 151. *Camer. in Plat. Timeo*, "ſays it is applied to the Beginnings and Top of Things." 152. Βαρικέφαλος — "but in *Vitruvius*, Book III. chap. 2. *Barycephalæ* *, they are thought to be Buildings, ſo called, he writes, becauſe their *Faſtigia* (either Tops, or the Temples built on their Tops, raiſed in Form of a Pyramid,

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* "A very odd Account this, that Buildings ſhould be called *Heavy Heads*, becauſe a few Images ſtood upon them, for ſo they conſtrue the Word, *Bàrycephalæ*. There is little Doubt but the Antients meant by them Buildings whoſe Heads or Tops had Repreſentations of *Glory* upon them; the Word for *Glory and Gravity* of old being the ſame, and *Glory* the Cauſe of *Gravity* ſtill; and their ſacred Edifices were conſecrated and made for Figures to deſcribe the Natural Agents; and the Heads of theſe Buildings were the moſt ſacred Parts, where the principal Figures ſtood, their Heads had the Glory on them; and thence ſo named.

Ainſworth's

Ainſworth's T. L. L.) were adorned with Figures made of Earth or Braſs, gilded over, and ſo were as it were made heavier by theſe Images being upon them." 153. "*Pliny*, the Top of the Palm-Tree." 155. Κεφάλωτον, "No Doubt from the Chapiters which it had on it, in the Shape of Ants hanging in Cluſters, *Gorr.*" 156. Κεφάλιον, *Dioſc. lib.* iv. *cap.* 150. "*Pliny* ſays it is from a bulbous Plant, wrapped with Coats one upon another, its Root fibrous like Onions*." 157. "The Summary or Heads of the whole." 159. "*Cephalus* beſides is the proper Name of him, who is imagined to have been in Love with *Aurora*. *Jer.* lii. 22. LXX. Γείσος, The Eaves of a Houſe, *S. T. lat.* (confounded by *Vitruvius*'s Deſcription) The Chapiter of a Pillar. *Varro* 3. *de Ruſt. cap.* 5. At the Entrance into the Houſe, at its Sides to the Right and Left, are Porches on the antient Stone Pillars, ſet with low Trees between them; and as the Porch is covered with a Net from the Top of the Wall to the Chapiter, and from the Chapiter to the Pedeſtal, they have all Sorts of Birds in them. There is a great Deal about the *Epiſtylia*, Chapiters, in *Vitruvius*." This Word is uſed for ſomething upon the Baſes of the Seas, 1 *Kings* vii. 31. LXX. γλύφη, a Cavern, "Sculpture, Engraving, (*apud* LXX. *interp.*) when it is ſpoke of Idols," it means an Emblem. *Eſth.* i. ii. LXX. διάδεμα, *Diadem*, *S. T. t. ſ. c.* 963. ἀνάδημα *Anadem*, "What the Head is incircled with, a Crown. *Eurip. Hippol.* 964. What was on the Head, but was particularly ſpoke of the royal Head-Dreſs, *viz.* a Sort of Ribband or Fillet according to ſome." The Verb's Uſage, *Jud.* xx. 43. LXX. Κατακόπτω ἔργον. Interlineary Verſion, circumdederunt, *they encloſed the* Benjamites *round about.* Pſal. xxiii. 13. περιέχω, *S. T. t. i. c.* 1318. "ἔχω is put for περιέχω, to encircle, ſurround." 1343. ἔποχη is alſo the Place of the Planets in the Zodiac, or State of Heaven, and Poſition of the Stars. *V. l. Hermol. in Plin. et Cæl. lib.* i. *cap.* 15. 1353. περιέχω, to ſurround, inviron, go round, — The Air which goes round; or the Air Spread round about us, or diffuſed every Way. περιέχομαι to be ſurrounded as a Man is by his Satellites or Servants — *Herodotus* — ἐμπεριέχω *Ariſtotle of the World* — thoſe Stars which are contained in the Circuit of the Air, or are in the Air. συνέχω, ἔχω, Firmament;" that which encompaſſes and compreſſes, *&c.* every Thing, of which ſundry Citations in *Kircher*'s *Concordance.* צר 1 *Sam.* ii. 32. *The Firmament. Prov.* xiv. 18. κρατέω. *S. T. t.* 2. *c.* 402. κραταιόω, " ſtrong—whence κραταίωμα the Firmament," of which ſee the Attributes—πανκράτις, *omnipotent*; πανκράτιον a wreſtling Match." 411. κρατέω " to get the Power, to command, to be Lord, alſo to be Maſter of, *&c.*" μένος the ſame Signification. 885. alſo ἀέρος εὐμένεια, the Mildneſs of Heaven; *Virgil*, a mild Air: a Station in *Theophraſtes de Cauſ. Pliny lib.* ii. *cap.* 17." but it is the beneficial Force or Impulſe of the Airs; from this Root alſo ſeveral of their great Gods took their Epithets as follows. They uſe κρατέω *Pſal.* lxiii. 6. for ענק " to wear a Collar or Chain about the Neck." *Hab.* i. 4. LXX. ὑπερίσχυω, *S. T. t.* 1. *c.* " to prevail by Strength againſt." *Job* xxxvi. 2. LXX. μένω, *S. T. t.* 2. *c.* 877. " *Ariſtotle* from *Heſiod*, bearing and ſuſtaining the Tempeſt." *Pſal.* cxlii. 8. LXX. ὑπομένω, to ſuſtain. μένω is alſo uſed for עמר, which I have ſhewed is, to ſupport, ſuſtain. They alſo uſe διάδημα, (*Diadem,*) for צניף, ſo στέφανος, κίδαρις, (*a Cap, or Turban*) μέτρα, (*Mitre*) διπλοῖς ἔνδοξος, *a Cope which*

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* Which ſhews what the *Iſraelites* meant by luſting after the Onions of *Ægypt*.

the Prieſt ſacrificed in, of Glory. S. T. *t*. 1. *c*. 1037. and στέφανος for עטרת, *S. T. t*. 3. *c*. 1022. "to crown." 'Tis evident from the Meanings of the ſeveral *Greek* and *Latin* Words uſed, that this Word ·כתר is a general Word for and ſignifies this Syſtem; the ſame as we now expreſs by the Word Spheres, &c. and this ſet upon the Supporters in two Parts or Hemiſpheres, was an Emblem or Repreſentation of it or them.——By the Fire at the Orb of the Sun as the Head, and the ſeveral Spheres which encompaſs it, divided each by the Circle which each moved Orb deſcribes or is rolled in its Courſe about that Head, and as the Word כתר uſed as a Verb, and the ſeveral Verbs uſed for it expreſs, to encompaſs with Force, Power, or *Impetus*, ſo as to prevail upon, to rule or govern; and as the Heavens or Spheres are by their Motion poſſeſſed of Powers to rule and govern the Orbs, and as the Manner was and is by moving and keeping each in its reſpective Courſe, it expreſſes the Subjects they rule, the Manner how theſe rule, and the Order in which thoſe are ruled: And as the Princes, Princeſſes, Prieſts, &c. had each an Emblem of, or of an Hemiſphere, of this, compoſed of a Cap with Circles with bright Stones in them, with

Rays or Horns from the Head to them, placed upon their Heads, and from the Part it was placed upon in common Acceptation took its Name of Crown; (though that is a Corruption of the *Hebrew* Word קרן the Rays which the Heathens repreſented by Horns, by which the whole is governed, and has been repreſented by what we call a Garland) A Crown was the Emblem of Victory, Power, Rule, in the Perſon wearing it. Indeed among the various Sects they were repreſented of different Sorts of Matter, and alſo perhaps from the different Orders, different Degrees of the ſame Order, ſome of Gold and pretious Stones, ſome of fine Cloth convolved or rolled about their Heads; ſome of Garlands with ſacred Boughs, Flowers, *&c.* but they were all to the ſame End. And as theſe *Greek* and *Latin* Words are uſed for theſe emblematical Repreſentations, ſet up before the Gates of the Temples of the Heathens to the Heavens, and thereby what they repreſented were attributed to them: Whether this Syſtem and the Powers, *&c.* in it, which had been ſo dedicated to the Heavens, (as it was placed by God's Direction before his Temple) may be ſaid to be dedicated or attributed to him, or whether they ought to be termed Trophies, as *Tretzes apud Lycophronem*, *Pauſan.* &c. cited *S. T. t.* 3. *c.* 1617. ſays they were firſt erected to and for the Honour of Ἡρα and Ζευς, (*Juno* and *Jupiter*, or Spirit and Light.) [the two oppoſite Motions of the * Heavens] for the Benefits received from them, or as the Word is accepted, as Trophies of God's late Victory over theſe Powers, let the Learned ſettle.

But further, the LXX. uſe the Word επιθημα, which they uſe for כתר, alſo for תניפה. *M.* " Elevation, a Dropping; to move every Way. *C.* Some Sacrifice was moved every Way, towards the Eaſt, Weſt, South and North, to ſhew that Sacrifices ought to be offered to the Praiſe of God in all Parts of the World, as the old Hebrew *Menach*, 61, 62." *Zant. Pagn.* 1558. " Agitation, *&c. Syr.* bent, inclined, nod to, *Ar.* ſome Idol. a certain City in Ægypt. 1 *Kings* iv. 11. *Joſ.* xi. 12. and xii. 23. xvii. 11. *Kirch. Concord.* נוף to move any Thing every Way; תנופה ſomething ſo moved, the Offering to be moved about, which was moved here and there, up and down in the Sacrifices." They alſo uſed for this Word ἀφαίρεμα *S. T. Gr. t. ſ. c.* 191. they are the Parts which were taken from the Sacrifices. — *Greg.* the ſame, *of the Law of* Moſes. For this they alſo uſed ἀϖαρχὴ, (*Firſt-Fruits*) *S. T. Gr. t.* 1, *c.* 557. ἀϖάρχομαι, ſays *Budæus*, to pay the Firſt-Fruits, or gather them. " *Herodotus* alſo, to make a Drink-Offering." and many more.——This Motion was to be given to the Gold, the Braſs, the Sheaf, the Oil, the Bread, the Lamb, and the Parts of Creatures offered to God in his Temple, which we tranſlate WAVE, and was an Action of attributing the Motions performed by theſe Agents or Powers, (and had been attributed to them) to God, as רם was of the Heave-Offering. Whether theſe were each waved round ſeven Times, as the ſeven Orbs are moved, or alſo as the Waters circulate, and alſo up and down as the Vapours riſe and Rains fall, for which the Word is alſo uſed, appears not. But there are ſeveral other Precepts about it. It was alſo uſed for the Motion of the Hand, and ſo acknowledging, that his Hands reach every Way, and to every Place. 2 *Kings* v. 11. *Naaman* was wroth, becauſe *Eliſha* did not uſe this Motion, as it's plain he muſt know others had done; as we render it, ſtrike his Hand over the Place, and recover the Leper. And *Jer.* iv. 6. *Noph* in *Egypt* (where it

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* So Second and Third Perſons.

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is like there was a Temple to theſe Powers with this Attribute and theſe Services) was threatened to be deſtroyed.

Inſtead of כתר 2 *Par.* iii. 15. is uſed the Word הצפת LXX. κεφαλις, *Lat.* Operimentum. (*a Covering*) Κεφαλις was applied to כתר as is explained there; and *Operimentum* is only a general Word, determines nothing till it be ſhewed what Sort of Covering it was. *C.* צפף Syr. *Series, Ordor. BB. Ar.* Orders of Angels, when any Thing is put in right Order, *&c.*" This Word is uſed 2 *Par.* iii. 6. in a Deſcription of the Temple which was an Emblem of this Syſtem —lat. *and* יצף *covered* (Engliſh *garniſhed) the Houſe with pretious Stones for Glory, and the Gold was the Gold of* Parvaim. This could not be *covered*, becauſe it was not covered with pretious Stones; they were to be put in ſuch Orders, as emblematically to repreſent to View the bright Orbs and Stars, the Gold to repreſent the ſhining Heavens. LXX. Κοσμεω, *S. T. Gr. t.* 2. *c.* 391. " to reduce a confuſed Heap into regular Order; thence, applied to the Formation of the World, ſee *Budæus*, *p.* 792. As *Anaxagoras* writing of the Nature of the Gods, was the firſt who would have the Ordering of all Things, and the World to be deſigned or planned by an infinite Mind and Reaſon; and elſewhere all this Diſpoſition of the Stars, and this regular Furniture of Heaven, *&c.*" *M.* צפה "to conceal, put a Covering upon." *Numb.* xvi. 38, 39. *a Covering.* LXX. περίθεμα, a Hemiſphere, the ſame as they uſe for כתר, and ſo all their Images were covered with Gold, the Emblem of the Heavens or Light. *Coc.* "to put a Covering of Plaiſter on any Thing, give it a Look and Face.—צפוי, a Covering, a Spreading over, מצפה covered, hid, concealed, צפה to look, obſerve. צופה a Watchman, or Obſerver. *plur.* צופים." LXX. Σκοπος, *S. T. Gr. t.* 3. *c.* 824. a Watch or Obſerver; one who from a proper Stand, watches and catches Tunny Fiſh." *t.* 1. *c.* 1455. ηλιοσκοπιος, "one who crowns his Head with the Sun: *Helioſcopium* in the ſame *Pliny*, Book ii. *c.* 21. is a Species of the Sun-Flower, or Heliotrope," (turning to the Sun) 1455. ηλιοτροφον, (*Eliotrophon*) by ſome is called the great ἡλιοτρόπιον (*Eliotropion*) the Turn-Sol, or Sun-Flower of *Celſus.* Some Sort of a pretious Stone, according to *Pliny*, a Sun-Dial, an Inſtrument to obſerve the Hours by; or Place in which the Hour of the Day is told by the Sun; a Dart, or Quill caſting a Shadow, which went round with the Sun." *Athen. lib. 5. (B. interp.)* on the Roof a Sphere or Globe, in Imitation of that Sun-Dial which was at ——" From the Miſtake of שמש for the Orb of the Sun, the Moderns have miſtaken ηλιος, *(Elios)* the Rays going out and returning, for the Orb. *S. T. t. 1. c.* 1454. " The Heat of the Sun, *v. l.* from *Thucydides*, the Antients derive it from αλς, as *Euſtathius* ſays; for in the *Doric* Dialects ηλιος is called αλιος," which I think is the ſame as אל. *t.* 2. *c.* 1543. μεσουρανιος" in the Middle or Navel of Heaven, as *Gaza* interprets it, μεσουρανου αὐτοῦ τοῦ ἡλίου, the Sun paſſing thro' the Midſt of Heaven," which is the Center of Heaven within, the Rays of the Heaven going out from, and returning to the Orb of the Sun. So *S. T. t. 1. c.* 129. " ἀὴρ *(plur.* Aëres *Vitruvius)* is derived from ἄω to breath, blow —*Plato*, either becauſe it is always flowing, or becauſe Spirit áriſes from its flowing."

In another Senſe as they took the Heavens for Gods and Inſpectors of their Actions, as *al, c.* 829. *Lucian*, " the Gods look down upon the Earth, &c." Hence all the Expreſſions of *Aleim* for God, Prophets againſt their Inſpectors, of himſelf inſpecting, *&c.* againſt the Inſpection of the Heavens.

מצפה "An Obſervatory, a Place on high. צפית a *Speculum,*" I think, the Aſpect or Proſpect, as *Iſa.* xxi. 5. *Watch in the Watch Tower*, but it is to obſerve the Object, v. 6. *what he ſeeth.* So *Ezek.* xxxii. 6. צפתך lat. *of thy Swimming*, M. "of thy Speculation," *Syr.* "of thy Watch Towers." But the Text ſays, *I will ſpread over the Face of the Land a Covering or Proſpect of thee, of thy Blood, to the Mountains, and the Rivers ſhall be filled with thee*; and here in the Text it was the Emblem of that which covered them, and was the Object of their Obſervations. צפן *Abſconſio*, is uſed in *Ezek.* vii. 22. for the *S. S.* and ſignifies Incloſure, incloſed, *&c.* ſo ſecret, and the North, ſo called as it is hid from the Sun." But that is not true, becauſe it is but one Part of the Year ſo; but I think becauſe it is always covered with Snow and Ice; and *Pharoah* called *Joſeph* צפנה פענח *The Revealer of the Secret.* Hieron. *Lingua Ægyptiaca*, "in the *Ægyptian* Language, Saviour of the World." So בעל צפון *an Idol*, the Spirit, the Ruler of that which covered, incloſed them, of the Heavens. See *Trinity of the Gentiles.* p. 302—304.

1 *Kings* vii. 16. קומת *The Height of one Chapiter* (Sphere) *was five Cubits; and the Height of the other Chapiter was five Cubits.* 2 Kings xxv. 17. *And* קומת *the Height of the Chapiter three Cubits.* 2 Par. iii. 15. *And* ארך *in Length, and* חצפת Operimentum, *the Chapiter on their Top was five Cubits.* Jer. lii. 22. *And* קומת *the Height of one Chapiter five Cubits.*

Here is another ſeeming Difference; two Deſcriptions which ſay that קומת of the Chapiter was five Cubits, and one that ſays קומת Dimenſion, Extent, (with Regard to Poſition of up or down) was three Cubits, and one that ſays the *Operimentum* was five Cubits ארך *long*; theſe ſeeming Differences as I have ſhewed in the Length of the Supporters, ſerve to explain, *&c.*——It is true there is a Difference between the common Cubit and the Cubit of the Sanctuary, about as three to five, but this I think is not the Caſe here. There ſeems a Neceſſity from the Number of the Parts, and the Height of their Situation, that the Dimenſion ſhould be by the longeſt Cubit, that the Parts might be diſtinctly ſeen: Indeed one might ſuppoſe that the firſt and laſt Definition of כתר *Coronamentum*, and the *Reticulum*, &c. following, which was on the Circumference,

rence, made it up five Cubits; and in the ſecond that the *Coronamentum* being three and the *Reticulum*, which is next deſcribed, and was about it, muſt be at a Cubit Diſtance from the *Coronamentum*, and ſo the Diameter of the *Coronamentum* with the *Reticulum* five Cubits, and perhaps this may be true. But it is moſt certainly true, that as theſe Hemiſpheres were not of equal Dimenſion each Way, the third Deſcription, which was the ארך, determines that the Extent of each the longeſt Way was five Cubits, and it muſt alſo be true (and indeed ſo it appears to be very exactly) that the Hemiſphere, including the further Tropick, is from the Pole to the Center of the Diameters of the Mouth or Tropick, three Cubits.

Tho' שבכים Reticula (*Net-Work*) be next in the firſt Deſcription, yet גלת rotunda Vaſa (*Bowls*) &c. comes in before it in the ſecond, ſo I muſt purſue the Order as it ariſes out of the ſeveral Deſcriptions.——

1 *Kings* vii. 41. שנים The two Columns, and גלת Vaſa rotunda, *Bowls of the Chapiters* (Sing. in the *Hebrew*) which were on the Head of שתים the two Columns, and שתים *the two Net-works to cover* שתו *the two Bowls of the Chapiter*

(Sing. in *Hebrew) which were upon the Heads of the Columns, and the Pomegranates,* &c.—שתי *the two* גלת *Bowls of the Chapiters which were upon* פני *the Faces of the Pillars.* 2 Chron. iv. 12. *And* הגלות *Orbs, the Pommels, and* כתרות "the Crowns" *Chapiters upon the Heads of the two Columns; and* שתים *the two Networks to cover* שתי *the two Orbs, Pommels of the (*Crowns*) Chapiters which were upon the Heads of the Columns,* &c.—*to cover* שתי *the two Orbs, Pommels of the Chapiters, which were upon* פני *the Faces of the Columns.*

Here ſeems a Difference in the Deſcriptions of Numbers, and the Tranſlators have changed the Numbers; ſome of our *Lexicons* make from the Word שנה *to repeat*, שנות *two*, שני and שנים the ſame, and the *Fæmin.* of it שנתי and שנתים; and abridged שתי and שתים, the ſame; ſome make שתה *to drink*, the Verb to שתי, and perhaps as Drink is the ſecond Support of Life, or as Meat and Drink are the two.——There want ſome Rules about theſe, how each is to be read, when *two*, when *ſecond*, when *both*, when *either*, &c. which would ſpend too much Time here to determine, and form them. But if there were not theſe Differences to determine them, as the ſingular Words are included by and refer to the two Columns, and as each of the Parts were apparently little more than half of the whole, though each had the moving Orbs in them, as they both were deſigned to repreſent but one, theſe גלת and כתר may very properly, where they ſtand, be wrote in different Numbers.

גלת — גלל. *M.* "a Globe, or whatever is turned round in a Circle. *Chald.* Heaven, or the Orbs of Heaven. *Syriac* the ſame." *C.* גל, "to roll, roll down," here, the Orbs. גלגל "an Orb, Wheel, Sphere. *Chald.* that which revolves orbicularly — hence the Aſtronomers call the ſeven Spheres of the Planets גלגלים *Galgalim.* a little Sphere, Epicycle, a Circle within another. *Syr.* Cœleſtial Sphere. *Kirch. Concord.* Dan. i. 10. גיל a Planet." *Them. Gloſſ. Heb. p.* 238. ἔλεος, *Diſcus*; גלת, *Arab. Interp.* Diſcus, the Body of the Sun. *S. T.* 1. *c.* 1017.

— 1 *Kings* vii. 41. גלת. LXX. ϛρεπτος, "Things that would eaſily turn about." *Kirch.* גל a Turning or Bending. *S. T. Gr.* ϛρεφω "to turn, wind, bend, twiſt. 1079. what will turn or twine, or is turned round. *Iliad.* V. *v.* 248. *Heſych.* wreathed as a Coat made of Mails, *i. e.*

a Coat of Mail. *Iliad.* ι. *Herodotus* the wreathed Collar on the Neck. *Plutarch*, the Miſt; *the golden Bracelets and Collars lying here and there*; alſo twiſted Ropes in Sculpture, as is gathered from the firſt Book of *Kings*." 1082. ϛρεφίος*, a Shifter, one who can wind and turn: It is an Epithet of *Mercury*, as *Ariſtophanes*." 1085. *Pliny*, book xxi. chap. 2. "The Antients made Uſe of ſlight Crowns, which they called *Strophia*, Wreaths, thence *Strophiola*; and perhaps theſe Crowns were ſo called from their Flexibility; or becauſe they were wreathed or twiſted together of Flowers and Leaves, *&c*." ϛροφαλίζω, the ſame as ϛρέφω. Alſo ϛροφάλιγξ, a Turning round, Vortex, Bending, Circle. *Aratus*, of the ſpiral or winding Line, which *Cicero* thus tranſlates, *in its Courſe, turns in a ſhorter Circle within.* Germ. Cæſar thus, *for it turns itſelf ſhort on a Hinge*; Duſt which is whirled about by the Wind, and twiſted round in Circles." 1090. ἀποϛρέφω. *Aratus* — Cicero, *but always carries* (loca Cœli) *the Heavens backwards in a Circle.*" 1090. ἀποϛρο-

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* Verſutus, ut quidam interpretatur, qui multas [novit, this *novit* ſhould be *movit*, as the Word and his Name ſignifies, which makes them make ſeveral Conjectures] movit ϛρόφας: Epitheton eſt *Mercurii*.

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φία "one of the Names of *Venus*." 1094. ἐπιστρέφω "to twiſt in, twiſt together." *Plato*——to torture, vex; it is conſtrued alſo *to attract, to carry along*; "Hence ſprang our Miſtake about *Attraction*, which is no more than that Action of the Heavens upon an Orb, explained above by *Aratus*. c. 1090. 1097. Καταςρέφω, *Plutarch* in *Sylla*—*the Day turning down and inclining to Night*." 1098. περιστρεφω, " to turn about, turn round, turn in a Circle, or over and over. *paſſive*, to be ſo turned. *Aratus*, as above, from *Proclus* on a Sphere — deſcribes a Circle." 1099. συμπεριστρεφω "to turn round together, &c." *Ariſtotle* of the World, 1101. σύστροφη "a Turning round or Revolution, Convolution, which is orbicular or in a Ring, Vortex, &c." The Imitation of this in their *Olympian* Games under another Word. *S. T. Gr.* 1. *c.* 1039. δολιχεύω, *Epigram*. lib. 2. — *Philo* of the World, which *Budæus* tranſlates, *Natura Curriculum quaſi Circenſe peragit*, Nature deſcribes as it were the Ring or Courſe on the *Circus*.

2 *Chron*. iv. 12. נלות LXX. Βασις. — *Interl*. γωλαθ. This Word which is an Agent expreſſes the Actions of the Movers, as a Patient the Things moveable and

moved, has not eſcaped the great Miſtake of miſ-conſtruing ſome Words it is uſed for in the Bible, ſuch as the Machine which carries, or the Agents which ſupport the Earth's Motion for Foundations, but has been uſed in that Senſe by ſome few, ſuch as *Vitruvius* (*S. T. t.* 1. *c.* 636.) and ſince they had forgot that Impulſe of the Air, and called that effected by it *Gravity*, it has been ſo conſtrued as at. *ibid.* 721. Βασις *weighty*, *heavy*, ſo we muſt trace it with its Præpoſitions to ſhew its true Meaning.

S. T. t. 1. *c.* 634. " Βαίνω, *fut.* βήσομαι, *perf.* βέϐηκα, from βάω, to march, proceed, go. *I. c.* 6. nine Years were gone." 635. Βάσις, " Step or Going." 641. ἀμφιϐαίνω, " to walk round, go round, march round." ἀντιϐασις, the Going againſt, in Oppoſition to." 624. αποϐασις, " Deſcent. In *Iſocrates* it is advancing, a Going forth—a Sirname of *Jupiter*, whence ſome Sacrifices were offered [*Heſychius*, ibid. 643.] to him for a ſafe Paſſage, [as *Cam.* declares] before an Expedition. *Thucydides*, *Plutarch in Lucullus*, *Xenophon*." διάϐασις, " a Paſſage, paſſing over, or croſſing over." μετάϐασις, "Tranſition." παραϐαίνω, "*Cam.* renders it, to turn and go forward any Ways; others, to turn round, or roll, or go in a Circle." 654. Βιβασις "was as *Cam.* relates, a Dance among the *Lacedæmonians*, ſo called from the Nature of the Dance, coupling, joining; in which they propoſed Rewards to thoſe who excelled, Boys and Virgins, *&c.*" *t.* 2. *c.* 1542. οὐρανβαίνων one who goes thro' the Heavens, or aſcends up into the Air, 185." ſo ἀερόφοιτος, going thro' the Air or upon it.——133. they commonly conſtrue it, that which mounts up into the Air, and ſay, it is the ſame as *divine. Ib. t.* 2. *c.* 1542. & 1543. *t.* 2. *c.* 1594. οὐρανιάζειν, " to play the Game called *Ourania. Heſ. t.* 1. *c.* 1708. τεθριπποβάτης, one who rides in a Chariot. τεθριπποτρόποι, thoſe who at the *Olympic* and other Games run the Chariot-Races." 130. ἀεροβάτεω, and 152. αἰθεροβάτεω, the ſame as αἰθερεμβάτεω, to walk or go through and upon the Air, or Æther."

1 Kings vii. 17. שבכים *Nets,* מעשה שבכה *of Checquer Work for the Chapiters* (Sing. *Heb.*) *which were upon the Top of the Pillars.* v. 41.—*and the two Net Works to cover the two Bowls of the Chapiters* (Singular in the *Hebrew* as before) *which were upon the Top of the Pillars.* 2 Kings xxv. 17. *and the Net Work*——*upon the Chapiter round about all of Braſs.*

2 Chron. iv. 12. *and the two Net Works to cover the two Bowls which were upon the Top of the Pillars.* Jer. lii. 22. *and the Net Work* (or Wreath) *round about all of Braſs.*

שבך M. "*a Covering, Denſity, perplexed.* סבך alſo to condenſe or thicken. *B. L.* condenſe, bound together. *C.* the ſame. The Firmament, *Gen.* i. 17. as it were the denſer Part of Heaven. In *Arabic*, *Chaldee*, and *Syriac*, a Veil of Net Work, or Lettice—a Covering which Women wear on their Heads, cloſe, thick, adhering cloſely." *B. B. B. C.* 1 *Kings* vii. 20. מלקביל over againſt דבק *(Cohærentiæ)* the complicated Work. *ibid.* קבל obſcure, dark." LXX. *δίκτυον*, "a Net — it is, ſays *Heſyc.* the Middle of a Sieve, in which are many ſmall Holes —— The manifold and complex Interweaving of the Branches of the ſoporal Artery at the Baſe of the Brain, whence the animal Spirit is raiſed from the Vitals. *δικτύνη*, *Diana.* 1 Kings xviii. 19. *δασος*, Denſity.

This is not by Signification, but by Deſcription of its Situation a Covering to the reſt of the Parts: This Cover was an Emblem of the Circumference of the Heavens, and ſo of the Parts of this Syſtem, that ſtop the Courſe of the Light and condenſe it into the Spirit, and this as you will ſee, chains the fixed Stars.——Implicated Thickets, or Boughs entangled the Ram, *Abſalom*, &c. and holding and covering the complicated and broad ſpread Boughs of ſome Trees, were Emblems and ſacred. If this Caſe had been made of Meridians and Parallels to the Equator, as we make them now, it would have been in Squares like a Net or Lattice, but there is no ſuch Order in the Original: Tho' perhaps either originally or by this Miſtake, as that of *Job* xviii. 8. may be either a Thicket or a Net; a Net might be made the Emblem of that which entangles and holds Things; as Chains, of which hereafter, are to bind Things taken.

1 Kings vii. 17. גדלים Funes (*Engliſh*) *Wreaths—for the Chapiters which were upon the Top of the Pillars.*

M. גדל *, " Great. Tower. *plural* Ropes. *Chad.* and *Syr.* to involve, twiſt, untwiſt."

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* Mr. *H.* had inſerted here an Explanation of גדל, as that in *M. Pr. Pt. 2d.* p. 423. taken from the falſe Conſtruction which the *Jews* had put on the Word, in ſome particular Places of S.S. which being corrected in the *Confuſion of Tongues*, we choſe to omit the Authorities he had produced here, in Juſtification of that Senſe of the Word (thoſe Authors

1 Kings vii. 17. —— מעשה *the Work* שרשרות *of Chains for the Chapiters* [Heb. *Sing.*] *which were upon the Top of the Pillars.* 2 Chron. iii. 16. *And he made* שרשרות *Chains* בדביר *in the Oracle, and put them on the Heads of the Pillars.*

שרשרות. *M.* " Chains; it ſignifies the ſame as שלשלות. *B. C.* a Chain; in the *Cabula* it is a Book of *Hiſtory*, which links Times together, and maketh a Chain of them as it were. שלשל *to let down.* M.

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thors he hath cited being miſled by the ſame Authority which miſled him) and tranſcribe his own Words, *p.* 16. " I have corrected one Miſtake about the ſecondary Candleſtick, from which the Light is reflected in the Night, but not fully. The falſe Conſtruction of גדלים *Deut.* xxii. 12. and 1 *Kings* vii. 17. for twiſted Cords or Ropes, which hath gone by the Tranſlation into other Languages (as moſt of the falſe Conſtructions have) made me miſtake it for a Term for the Courſes of the Moon; but as the Candleſtick in the Tabernacle was made *Gen.* i. 16. 'tis very likely before *Geneſis* was writ, it refers for an Idea to that. Exod. xxv. 31. *Thou ſhalt make a Candleſtick of pure Gold.—Six* קנים *Pipes,—to each Pipe,* כפתר *a Knop* (Bowl) *and a Flower—that they may give Light over the Face of it,* with a Flower to repreſent the Irradiation of the Light, from each Apple or Ball, repreſenting a Planet, which are each named as diſtinct in the *Apocalypſe*; and each *Jew* was to wear the Figures of theſe *ſix great ones*, upon the Skirt of his Garment, and they were placed in the Crowns upon the Columns before the Porch of the Temple."

שיר. *Thom.* σειρα, שרות, a Collar, a Bracelet. *V. Monilia. S. Bulla. C. Chald.* a Chain worn by Way of Ornament both on the Arms and Feet, made of Gold. (*Periſcelides*) *Spr.* Ear-rings *M.* שרה a Coat of Mail. *Thom. Gloſ.* שרר the Navel —from שרשרות below, a Chain, becauſe it is twiſted together, like a Rope, of many Veins and Arteries, which the Fœtus is joined to the Mother by — a Knot, ſaith *Martinus*, tied together by Chains in the Middle of the Belly. *ibid.* שרשרות a Chain, to faſten by Chains. *Lut.* a Series, a Number of Things linked together in a Row: It bears a Relation to the *Chaldee* שרר to make firm, confirm, eſtabliſh, from hence is שרשרות, for many Things are ſtrengthened by Chains. *Rob. Ab. Ezra* will have the Root to be שרש with the *Reſh* doubled, and the Reaſon is, as *R. Sal.* writes, that as the Root binds a Tree, and makes it ſtand firm in the Ground, ſo doth a Chain any Thing which we would have ſteady and firm, *&c.* שרר, whence שר, the Navel, as if the Root were the Knot or Navel of the Tree."

1 *Kings* vii. 17. LXX. — I think, κρεμαστιον, *penſile*, " ſomething hanging down. *S. T. t.* 2. *c.* 418. it is a Strap, or a Rein hanging down, which any

Thing hangs by. 419. He underſtands by it ſome geometrical and aſtronomical Inſtruments hanging in the Air. *ibid.* hanging from the Scutcheon of the Temple of *Mars.* 2 *Chron.* iii. 16. *χάλαϛον,* "a Chain. *S. T. t.* 4. *c.* 366. to poliſh, turn about. The Stars in a long Row ſeemed ſuſpended as it were in the Middle of the Air.—*Exod.* xxviii. 14. *κρόσσωτον,* "a little Chain. 22. *κρόσσος,* a Chain. *Iſa.* iii. 19. שרות *κόσμον. S. T. t.* 2. *c.* 388. Ornaments worn by Women which they called *the World*——and *Virgil* calls it the Globe of the World: The Frame of Things well-regulated, and put in good Order."

The fixed Stars muſt be placed in *Equilibrio,* between the Preſſure of the longeſt Side, and the joint Preſſure on the Backſide, and Power of the Light on their Faces; *Job* ix. 7. *ſealed up the Stars.* If the fixed Stars be ſmall Bodies, and the Light very weak at that Diſtance, not able to ſet them a going ſideways, and the Pillars behind being inactive, that groſs Air which puſhes into the Light on each Side, will preſs them outward as far as the frozen Air will permit them to go. 'Tis plain the Stars are placed ſo far out of that Degree of Light, which gives

Occaſion to the Spirit to puſh into that Quantity of Light which is ſtopped by the moving Orbs, that it moves them; that for Want of that Degree they are fixed; and that the Emblem to expreſs that was to repreſent them hanging in Chains, as will appear more fully.

בדביר—M. " *Oracle*, the moſt ſacred Part of the Temple," the Word conſequently ſignifies ſecret, private, hidden, and theſe Chains were placed in the dark Part of the Circumference and behind each Star. LXX. *δασιρ*.

1 Kings vii. 17. שבעה, *ſeven for one Chapiter, and ſeven for the other Chapiter.*

M. " Seven; an Oath, Fulneſs; or Sufficiency." *C.* " the firſt we read of taking an Oath, and to have confirmed his Oath with a Preſent of ſeven Ew-Lambs, *Gen.* xxi. 28. was *Abraham*, the three ſeventh from *Adam*; ſee *Luke* iii. a moſt ſacred Number," *Kirch. Ædip.* 2. 35.—" nor is an Oath leſs ſacred, which whoſoever violates, ſhuts himſelf out, ſay the *Cabbaliſts*, from ſeven Things, Sacrifice, Peace, Wiſdom, Riches, Grace, Seed, Empire. *Chald.* חג השבעות the Feaſt of Weeks——The Ceremonies and Kinds of Oaths." Cl. *Lightfoot H. Heb.* 100. *Seld. Syr.* 11. *c.* 11. 2. *Buxt. Lex Chald. and Syr.*

Jud. e. 48. *Syr.*——*the ſeven Stars*, Rev. i. 16. Seven principal Feaſts; ſeven leſſer Feaſts. Seven Columns, *Prov.* ix. 1. *i. e.* the World and all its Elements. *B. B.* Seven Climes. *G. Nub. Prol.* Seven Thunders. *Ab. Arab. Seven Spirits*, Mat. xii. 45. *Seven Weeks*, Dan. ix. 25. Deut. xvi. 9. *Seven Lamps*, Exod. xxv. 37. *Cocc.* Gen. xli. 4. *Seven Kine.* Ezek. xl. 22. *Seven Steps.* Prov. ix. 1. *Wiſdom hath*—*hewn out her ſeven Pillars*, has built ſeven Churches on good Foundations; *ſee* Rev. i. 2, 3. Zach. iii. 9. *On one Stone ſeven Eyes*, not one Eye, as of the *Iſraelites*, for many ſhall look on that Stone. Zach. iv. 10. *Theſe ſeven.* Gen. ii. 2. *The ſeventh Day.* Lev. xxiii. 16. *Seventh Sabbath.*—When the Antients ſwore to each other, they uſed Symbols; not ſingle ones, but ſuch as were ſeven-fold, as conſiſting of the perfect Number, ſee *Gen.* xxii. 18. *Herodotus* in *Thalia*, *chap.* 8. deſcribing the Covenants among the *Arabians*, ſays, they uſed to ſtain ſeven Stones with Blood, when they took an Oath. *Rob.* He ſwore, repeating the Words of the Oath ſeven times, &c. *B. C.* Gen. vii. 2. *Thou ſhalt take to thee, ſeven, ſeven, i. e.* by Sevens, *Male and Female.* ibid. The *Hebrews* reckon up ſeven רקיען Firmaments, about which conſult *Solomon*. Pſal. xix. 7. ילך. *infin.* לכת *to go.* Hence the *Rabbins* uſe the Phraſe ככבי לכת the Stars that move, that is the Planets. The ſeven Planets are the Sun, *Venus*, *Mercury*, the Moon, *Saturn*, *Jupiter*, *Mars*. מזל —— The Stars whoſe Courſe is within the Girdle, or Sphere of the heavenly Signs, *i. e.* within the *Zodiack.*"

Though this Number of ſeven had its Riſe from the Order of Things God created to rule and govern this Syſtem, and the ſeventh Day was ſet apart to commemorate his creating and forming them, the Heathens had abuſed the Number with the Things, as appears *Numb.* xxiii. 28, *&c.* by *Balaam*'s ordering *Balaak* to build ſeven Altars and offer ſeven Sacrifices; and beſides theſe above cited, in many other Inſtances: And thence all theſe Appointments in the *Jewiſh* Syſtem, and particularly in this Emblem, to reclaim the Attributes miſapplied upon that Account.

No doubt the *Zabii*, the Heathens, whatever their Emblems were, ſwore by the Things which, they ſuppoſed, had the Power of avenging, and they were the Heavens irradiating, of which here the כתר the Crown, divided into ſeven Spheres, was the Emblem: And theſe Diviſions were made in the Air there, which repreſented the Heavens, by the Courſe of the ſix Orbs, excluding the Moon, who has her Heaven, within the Heaven of the Earth, and including the Earth, and emblematically by Rings with a Stone in each; ſo counting from the Sun, the Centre to the Circumference, is divided into ſeven Spheres, which they call Heavens or Firmaments; including the Moon, there are ſeven moving Orbs (גרלים) and to each of them one, ſo ſeven Supporters; with reſpect to, or for the immediate Uſe of the Earth, including the Sun, there are ſeven Candleſticks, and upon them ſeven Lamps or Candles, and ſeven Streams of Light; with Reſpect to the Sun, there is from it, ſeven Streams of Light to the ſeven moving Orbs, repreſented by *Sampſon's* ſeven Locks of Hair, with perhaps a Lilly on the End of each.

1 Kings vii. 18. *and He made the Pillars, and two* טורים *Rows,* סביב *round about* על *upon* [if within, *againſt*] *the one Net-work,* לכסות *to cover the Chapiter, which was upon* [or, *againſt*] *the Heads of the Pomegranates; and ſo he did for the other Chapiter.*

העמודים. I have ſufficiently proved in the ſecond Part of *M. P.* at *p.* 183, &c.

that עמד ſignifies to *ſubſiſt*, *ſuſtain*, *ſupport*. Here the Supporters of the Orbs in Motion; and that theſe were repreſented by Columns, *Supporters*, and by thoſe who gave that Attribute to *Baal* by חמר a Palm Tree. The Column or Tree with its Root to the Circumference of the Heaven, and its Top to the Orb. The Account they give us of the Palm Tree being ſtrong and tall, as Travellers ſay, it being ſtrong Timber, tall, and large like an Oak, with Abundance of Nuts, large as a Medlar, and long ſhaped like a Pear, good to eat, which yields a Juice which they call Palm Wine: So the Boughs and Top of thoſe Trees, repreſented upon the Tops of the Supporters, which the Architects call Chapiters, muſt I think be the Light, and ſmall Parts flying out, and receding ſucceſſively from the moving Orbs, by the continual Puſh of the Spirit upon each. LXX.——ϛυλος, but *Judges* xvi. 26. they uſe *χίων*. *S. T. Index χίω*, "to go, march." And yet purſuant to the old Miſtake, they make the Subſtantive, a Column or Pillar.

And two טורים *Rows*, Ranks. *M.* טור, Ordo, *Row* or *Rank*, intermixed with טיר *a Palace*, &c. *C. ibid.* and a *Series*. טיר Chald. *to divine* —— *J. H.* אטורית, they will have it to be that Sort of divining or ſoothſaying by Birds, which formerly they were expert in, *&c.* *Rob. Pag.* Series, Diſpoſition. In *French*, *Renge*, or *Rangèe.* (*Qu.* Teer of Guns) Some bring it from *Obſervation*, *i. e.* from נטר like טור.—— It is a Series of Things in a Circle. *Av.* טור is στίχος. טיר is a Fort, as being circumſcribed by a Circle. *B. C.* יטר an Exhalation riſing up like a Pillar, a Pillar-like Vapour. *Thom. Gloſſ.* טיר —— hence τειρεα the Stars, from their Rows and regular Courſes, *Scap. Lex.* 1526. *Homer* calls the Stars τειρεα. LXX. *The two* στίχους Rows of Pomegranates. *S. T. t.* 3. *c.* 982. Row, Rank or Series —— in the Quincunx, *&c.* *Ariſtotle lib.* ε. *de Ortu et Inter.*—that is, the other two Elements; for Air, συνστοιχεῖ, anſwers to Fire, Earth to Water; again Water, ἀντίστοιχει, is oppoſite to Fire, Earth to Air. *Ariſtotle.* There are two Ranks, that the one are placed in the oppoſite Station or Condition to the others. 989. στοιχειματικοὺς, they ſay they were ſo called who made little Images (*cæleſti ratione*) on Account of the Heavens, with ſurprizing Succeſs oftentimes from the Power of Fallacy, the Demons and Error; for the celeſtial Images, and (*Signa*) Signs, are called celeſtial στοιχεῖα, Elements. ϛοιχάζομαι *Iſocrates ad Dem.* to gueſs at the Mind of the Gods *(divine).*" They alſo uſe the Word γενος, *Genus*, and εξεδρα, a Seat or Rank.

In the Deſcription at *v.* 20, and *v.* 42. and 2 *Par.* iv. 12. this *Heb.* Word is joined with the Pomegranates, and it is plain, the Net Work, Chain Work Orders, or ſome one of the preceding Words, muſt include the Pomegranates, becauſe afterwards the Situation of other Things refer to that of the Pomegranate Orders. We are to ſuppoſe that the Prophets, who wrote the ſecond or other following Accounts, knew thoſe written before. —— Therefore they, by the Direction of the Spirit, might be ſhorter, or might explain what was moſt difficult before. But in the firſt Deſcription, the Writer could not refer to a Thing, which had not been named, or was not included in ſomething named, or was not expreſſed by a Word or Words well known to have the ſame Signification, which ſo had been made or caſt before——Nor would the firſt Writer leave a Word, which only refers to the placing of a Thing or Things, without naming the Thing or Things, if it had not been included in ſome Words before, which were well known to comprehend thoſe Orders and Things in them, which we ſuppoſe to be the Work in Chains, *Opus penſile.*

Whether this Word, in other Places, referred to ſome Things placed in two Sorts of Orders, for Emblems of the Heathen Worſhip, or ſome Sort of Things as Stones, *&c.* placed in ſome Orders, whereby they pretended they could divine; ſo that the Myſtery was in the Order, not in the Things, and thence all theſe Orders of Things in the Tabernacle and Temple, is not material to this ——Nor need I mention the Pretence of foretelling the Events of Things, by the Order of the Parts in Birds, *&c.* I think that Folly later, and out of the Queſtion here: 'Tis certain here they repreſented two Orders of Agents, or Things in this Syſtem.———Whether two טורים as they are here ſucceeding the Supporters, are to be taken for the oppoſite Columns of Light, like Sceptres with a Lilly, as afterwards, on the Head of each from the Orb of the Sun to one Side of each moving Orb, and of Spirit or Darkneſs from the Denſity at the oppoſite Part of the Circumference, (in Alluſion to the Light and Cloud, or Grains ſhewed in the Wilderneſs) which keep each Orb in or nearly in a Circle, and ſo are to be taken as *Agents,*

Agents, or *Orderers*, or *Keepers in Order*, and ſo the Word be of the ſame Signification as תור; or they be alſo to be extended to the Streams of Light from the Earth, Moon, and Planets upon each other, and the oppoſite Columns of Spirit which regulate their Deviations from perfect Circles; or whether here, as the LXX. and others conſtrue them, this be the ſame with thoſe, after that they ranked the fixt Stars into firſt and ſecond Magnitude, and theſe were two Orders of Pomegranates which were to repreſent them, whereby they pretended to foretell each Perſon's Fate, by the Situation, the Earth had at his Birth, to thoſe Stars, which was performed or ſo placed by the Operation of the Orders of the Light, Spirit, *&c.* is not of great Conſequence, becauſe the firſt may be included in other Words, and the latter is afterwards expreſſed.——But I muſt confeſs, I think they refer to the two Orders of Light and Spirit, becauſe they were chief, and need not be named, as will appear by their Situation and Uſes.

סביב *Round-about*, *againſt*, *on the Net Work*, &c. So far as this refers to the Supporters of the moving Orbs, however the Orbs and they were placed in this Repreſentation, whether in the Situation the cœleſtial Orbs were in at the Time thoſe were finiſhed, or at the Time the Plan was given, or at any other Time, chiefly from the denſe Work to the Side of each Orb, and within the Compaſs of the Tropicks; thoſe of the Moon or the Satellites out of thoſe Bounds, as they each moved from every Side.——If the Word *Supporters* imply more than one to each Orb, then theſe two Orders muſt refer to the Stars——If the two Orders be taken to be Rays of the Light from the Sun to each moving Orb, and the Spirit in that Line from the Denſity to the oppoſite Side of the Orb, they will be within the ſame Bounds as each of the Columns would be. ——If the denſe Work include the Columns, from a Line towards the Sun to the Side of each moving Orb, and the Lilly-work hereafter mentioned, be the Rays of the Light from the Orb of the Sun to each moving Orb, they will be within the ſame Bounds, and the two Orders muſt be the fixt Stars.——If theſe two Orders refer to the fixt Stars, they will be *undiquaque* againſt every Side of the Net or denſe Work (and muſt either be of two Sizes, or placed at two different Diſtances). But I need not dwell upon the general Words about Situation, becauſe they are more particularly explained by others afterwards.

לכסות *to cover. M.* " it ſignifies a Covering, Covert, Veil; to cover, conceal, hide, veil. *Syr.* and *Arab.* alſo a Garment, Cloathing. *C. ibid. Chald.* Engraving. *Ar.* He put on Beauty, *&c.*" LXX. I think, περικάλυψαι. *S. T. t. 2. c. 45.* περικαλύπτω, " *Plato in Timæo*——(conſtrued by *Cicero*) *ſo* (*Animus*) *the Mind, iſſuing from the Middle, compaſſeth round about the Extremity of Heaven, at its utmoſt Bounds,* (rotundo Ambitu) *in an orbicular Circuit. Homer*——which *Cicero* thus tranſlates, ſurrounded it with a Body, and cloathed it from without. Προκαλύπτομαι *Plato Gorg.* ——having the Soul cloathed and veiled with the Eyes and Ears, and the whole Body."——In this Senſe, as this Fluid which circulates on every Side between the Centre and Circumference, is taken for the Spirit, all the Orbs or Solids which are within it, are as the Parts of the Body to the Mind for it to act upon and with; here, if it refer to the Supporters, as the Spirit in the Nerves, or whatever Parts ſerve for the Agents which move the Parts of the human Body: If alſo to the two Orders of Light and Darkneſs or Spirit, to theſe Veſſels and Fluids, which regulate the Motive Force in human Bodies. If it refer to the two Orders of fixed Stars, as the ſolid Parts in the Body of an Animal, to anſwer each their reſpective Ends, ſupport the Motion, *&c.* But this only refers to Part.

הכתרת *The Chapiter* [Crown] אשר *which was* על *againſt the Heads of the Pomegranates; and ſo be made for the other Chapiter.*

If this were to refer to Supporters, and one of the Orders, to wit, that of the Spirit or Darkneſs, they would each with their Ends be againſt or upon the denſe Work, but as there are ſeven Circles, or Crowns or Heavens, it is all one whether he calls that here ſpoken of the Crown, with a Deſcription of its Place, or that Part of the Crown. —— The Part was againſt the denſe Work, and againſt or upon the Head of the Pomegranates. Some may make a Queſtion, which was called their Head. I think each of them was hung with that End, we call the Top, out of which the ſmall Rays go, downward; whether they hang ſo upon the Trees I am not certain. But if that Heaven or Crown from *Jupiter* to the denſe Work be one, then it is againſt or upon the Head of the Pomegranates every Way.

If אשר ſhould be conſtrued to refer to the denſe Work, then it is about the Head, or uppermoſt Parts, or Order of the Pomegranates.

1 Kings vii. 20. *and of the Pomegranates two hundred, Rows round about on* (againſt) *the ſecond Chapiter* (Crown.) v. 42. *and the Pomegranates* ארבע מאות *four hundred for the two Net Works. Two Rows* (or Ranks) *of Pomegranates* (or double-ranked) *for one Net Work* לכסות *to cover* את שתי *either* גלת *Bowl* (*or* Round) *of the Crown,* (LXX. Mechanoth) *which were upon the Face of the Pillars.* 2 Kings xxv. 17. *and Pomegranates upon the Crown round about, all of Braſs. And like unto theſe for the ſecond Pillar upon the Net Work.* 2 Chron. iii. 16. *and he made Pomegranates an hundred, and put them on the Chains.* iv. 13. *and the Pomegranates four hundred, for the two Wreaths; two Ranks of Pomegranates for each Wreath* (Net Work) *to cover the two Pommels of the Crowns which were on the Face of the Pillars.* Jer. lii. 22. *And the Net Work and Pomegranates upon the Chapiter round about, all of Braſs; and like unto theſe for the ſecond Pillar, and the Pomegranates. and the Pomegranates were ninety and ſix* רוחה ad ventum, *to the Wind; all the*

Pomegranates were an hundred upon (againſt) *the Net Work round about.*

רמן. *M.* "The *African* Apple; Pomegranate. *Arab.* the ſame. *Chald.* the ſame, and Licence; *C. ibm.* a natural and artificial Fruit. The Name of an Idol. *Æth.* Ραμνον. *Jud.* ix. 14. The *Æthiopians* —— think it is a Shrub of theirs, whence Fire may eaſily be produced, which they prove from the Place before-mentioned." LXX. Ροὰ, ρωὰ, ροίσχος, *S. T. t.* 3. *c.* 679. ρέω "to flow——but metaphorically we derive ρειν from Fire, as you will ſee *ſemipag.* 618. of the Tome, Let. A." *Ariſtotle de Vitâ et Morte*——κὴ ρεον ωσπερ ποταμος, "and flowed like a River. *C.* 683." "It is a Kind of Blaſt on Vines; *Roratio*, a Blaſt." 684. *Ariſtotle de Mundo* — like the Streaming of a Star, which ſignifies (*Stellarum Diſcurſum*) the wandering Courſe of the Stars, *Pliny* called, the Courſe and (*Lapſus*) Setting, or Gliding along." *Seneca Annot. v. l.* as *Polybius*, he ſays, uſed it for a Flowing, ſo for a Stream and Arm of a River. 685. ρυαξ of *Ætna* — it vomits out Floods of Fire. 687. εισρόος Influx. *Ariſtotle de Mundo* —for εισρέει it flows in. 690. περιῤῥέω ſo the Sea is ſaid by *Ariſtotle* to be περιρρεων flowing round us. ροίσκοι golden *Corymbi*, Bunches or Cluſters, put by Way of Ornament on the Garments of ſacred Perſons, called ſo from the Reſemblance they bear to the Pomegranate. *Exod.* ch. xxviii. *Prov.* xxv. 11. *like Apples of Gold in Caſes of Silver.*" So *Cant. S. T. Lat. p.* 96. " a golden Image of the happy Apple. *Ovid. Epiſt.* 19. Golden Apples. *Virg. Eclog.* 3. African; *lib.* 5. *ch.* 10. Granate. *Pliny*, Book 26. ch. 8." ——The Word in *Hebrew* and in *Greek* ſignifies to project; of a Fluid, to make flow: And this Fruit was made an Emblem to expreſs the Part which the fixed Stars had in making the Light flow inward, neither upward nor downward but both towards the Centre, ſo towards this Orb, *&c.* which Power was worſhipped under this Attribute.

'Tis likely they pitched upon this, becauſe of the Reflection of Light, from the Colour of the Fruit, or from the Juice or Grains within, or from the ſix Leaves or Rays from its Top, as the Stars have or appear to have. And this Word is expreſſive of the Aſſiſtance the Stars give in making the Spirit return, and of all the Emanations they dreamed the Fluxes brought hither. Hence the *Jews* were to make Pomegranates of Blue and Purple, and Scarlet, and hang them upon the

Skirt of *Aaron*'s Garment, and ſomethin in Imitation of this was in the **Roofs** the Tabernacle and Temple.

It is obſervable, that the two Orders **with** out Names, are ſaid to be to **cloath** adorn the Crown, which was **upon** Head of the Pomegranates, the **ſeventh** Crown or Heaven —— and here **the two** Pomegranates Orders in each denſe **Work** are to cloath or adorn גלת rotunda **Vaſa,** *or* duos orbes Coronamentorum; *the two Rounds or the two Rings of the Crowns.*

If גלת be taken for the Revolution of the כתר, then they are fixed in it and aſſiſt it. If it be taken for the rolling Syſtem, *inter alia*, for the Earth, in one Senſe they cover or include, in another Senſe, they cloath or adorn them or it, or its darker Side with Light. Though theſe mentioned are two of their moſt obvious Uſes, they have many others which are comprehended in theſe Words.

מאה LXX. ἑκατὸν *S. T. t.* 1. *c.* 1164. " a hundred ſtands ſometimes for infinite — according to *Euſtat.* &c. *Schindler.* 2 *Kings* xi. 4. מאיות *Centuriones*, Hundreds, the Number is often underſtood. Prov. xvii. 10. *than to ſtrike a Fool an hundred Times.* Eccleſ. vi. 3. *if a Man beget an hundred Children*, an Hyperbole for many. Eccleſ. viii.

12.

12. *and do Evil an hundred Times*. *S. T. Lat.* 444. a hundred is often an indefinite Number with the Poets. *Horace*, &c. hundred Pillars. *Martial. Epigram.* 12. Horſes by hundreds. 449. to divide by Hundreds. *Cic.* the *Roman* People were divided into Ranks by Hundreds at their Aſſemblies, *Comitia*. *B. C.* 1535. ספירה "among the *Cabaliſts* — the ten Numerals are the ten firſt myſtical Poſitions concerning the divine Properties, Notions, or Attributes; and are the general Foundations on which all the cabaliſtical Theology is built; by the true Knowledge of which the Studious attain to the Principles of the cabaliſtical Theology. *ibm.* 1223. *Fagius* — the Number Ten is certainly in great Veneration with the *Hebrews*, whence they don't circumciſe a Child, *&c.* unleſs ten are preſent." עשר. "Rich, Ten, and ſometimes ſtands for many; becauſe Ten is a perfect and compleat Number; as it is the greateſt of the Units, and the laſt, and the Beginning *(Denariorum)* of the Tens." *C. p.* 2086. מנה—"a Collection of Votes. The Number of Ten, applied to the Ten Perſons in their ſacred Aſſemblies, for there are many of the Ceremonies they don't perform without this Number. *Vid. Phagium, P. Avoth. o.* 3."

I have ſeen, but I cannot remember where, the Word *Ten*, I think in *Greek*, made the Completion of Numbers, and that multipled into itſelf ſhewed to expreſs, as we ſay, an immenſe or infinite Number.——However, it is plain by the Texts, that an hundred Pomegranates were an Order, and that there was two Orders to each Hemiſphere, and ſo four to the whole Heaven.

Cocc. כתרת. "Each Order (or Rank) had a hundred Pomegranates; that ninety and ſix might be towards the Winds, *i. e.* twenty four toward each Quarter of the World; and beſides four in the four Corners, (*Angulis*) and ſo a hundred. *Jer.* lii. 23. —— it is made out, that in one Order were the larger Pomegranates, in the other the leſſer, and that they were diſtributed into three Rows on every Side; that, as it appears to me, in the firſt Row were nine, in the ſecond eight, in the third ſeven, Pomegranates; ſo that in all the Rows together, toward the four Quarters of Heaven, were ninety nine."

Indeed it appears by the Uſage of the Word *Four* in the Scriptures, not only as a Deſcription, but in many other Caſes, in Oppoſition to the falſe Worſhip, that the Heathens had divided the Heavens into four Parts or Spirits, by that Number being ſo often uſed in the Symbols, Dimenſions, Angles, Horns, Orders, Sacrifices, *&c.* 2 *Kings* ix. 24. *Jer.* xlix. 36. *Ezek.* xxxvii. 9. §. xlii. 20. *Dan.* vii. 2. §. viii. 8. §. xi. 14. *Zach.* ii. 6. §. vi. 5. *Four Spirits.* Iſ. xi. 12. *Ezek.* vii. 2. *Four Wings of the Earth,* ſo *Jer.* xlix. 36. *The four Spirits from the four Extremities.* Ezek. i. 5. *Dan.* vii. 3. *Four Animals.* And *Four* to almoſt every Thing and Part in the Viſions; and ſo we find LXX. τεταρτος. *S. T. t.* 3. *c.* 1418. *Thuc. l.* 6. *p.* 206. "They uſed to erect Stone Pillars four-ſquare to *Mercury,* the Boundaries alſo which *Mercury* preſided over, *&c.* 1421. The Number Four, which the *Pythagoreans* held ſacred, and ſwore by, as *Pythagoras* himſelf ſays in his Golden Verſes — ſo in *Lucan*; ſee alſo *Macrobius, Book* i. *Comm. in Som. Scip. ch.* 6. where among other Things he ſays, that the *Pythagoreans* reverence the Number *Four* ſo far, that they place it among their *Arcana,* as neceſſary to the Perfection of the Soul." *Plutarch,* &c. *ibid. S. T. Lat.* 627. "the Number ſquared, or perfect and compleat. 628. — becauſe guarded at the Entrance by a Stone fourſquare." *Schin. Lex.* ארבע, — *Arab.* the fourth Day, *Mercury*'s Day. *C. Syr. Æth.* the ſame."

There may be ſomething in *Coc.* Conjectures of 12, or 24. for I remember to have ſeen thoſe Numbers applied by the Heathens to Agents or Diviſions in the Heavens, ſuch as Horoſcopes, Columns, Months, Hours, *&c.* which are not to be immediately found: But where he had his Conjecture of placing them in nine, eight, and ſeven, I do not know: What moſt concerns us is to know that they were made for us, to act each their reſpective Parts in this Machine, and not for other Syſtems, that they were placed againſt or upon the Denſity; that they are fixed as if they were chained ſo as not to be moved.

1 Kings vii. 19. *and* כתרת *the Crown which was upon the Head of the Columns* מעשה שושן *Lily Work* באולם *in the Porch, four Cubits.*

The Queſtion is, whether כתר here refer to the Crown upon the two great Supporters, or to any particular Crown, or Circle of the Heavens upon the Tops of the ſmaller Supporters, or to every Part of the Crown at the Heads of the ſmaller Supporters.

מעשה. I have already ſhewed that מ prefixed to a Noun makes it an Inſtrument or inanimate Agent, and here as the Emblems are called by the ſame Name as the Agents, this may be the Inſtrument or Agent of working; as *Coc. Job.* xxxvii. 7. Operarios ſuos, *his Workers.*

שׁוֹשַׁן. *M.* ששין, שש, שוש, "it ſignifies Joy and Gladneſs. Pſal. xlv. 8. *Oil of Gladneſs.* Iſai. xxxii. 13. *Upon all* בתי משוש *the Houſes of Joy.* C. ibid. *Chald.* שושין, a Species of Herb; a Tree whoſe Boughs they uſed to make their Scenes of. *Succo.* 13. Myrtle. *M.* ששה the Name of the Number *Six.*" LXX. *Tromm. Concord. Ezek.* xxxix. 2. ששה Καθοδηγεω.—*S. T. t.* 2. *c.* 1163. To be a Guide, lead in the Way. ששן a Roſe, Lily; it is a white Flower, always with ſix Leaves, and as many *Capillaments* within, whence ſome refer it to the preceding Root. *Arab. Syr.* a Lily. The Name of a City. An *Hexachord, Pſal.* lx. *Eſth.* i. 2. v. 8, שושנה המלך, a City. *Exod.* xxv. 31," Here the *Hebrew* is פרחיה *its Flowers. M.* פרח. "I. It is a Shoot or Sprouting forth, ſuch as in a Roſe or Lily, or a Wound. II. It ſignifies a Flight." See *ϱάϐδος, a Sceptre, Rays.* See *Cocc.* שרביט *σκήπτρον, Gyraldus, p.* 72. They uſed to worſhip Lances and Sceptres. Theſe Flowers upon the Emblem of the Candleſtick were a Repreſentation of the Irradiation of the Light from the Orbs, and in that 1 *Kings* vii.

26.

26. theſe two Words are joined ſo as to diſtinguiſh the Parts, Flowers of Lilies. *Schindler. Lex. ibm.* “ and *Pſ.* lx. upon שושן עדות *the Lily of the Teſtimony*: a Collar made like a Lily. *Pſ.* xlv. על שושנים upon the Lilies. LXX: *αλλοιωθησομενων, for thoſe who are changed*, they looked at שנה to change; there is the greateſt Likeneſs betwixt שושנים Lilies, and שנה change: Or שנים thoſe that vary, *i. e.* change; thence it came to paſs that they took one for the other.” *Arab.* סוסן אסמאוין Suſen Aſamavin. *celeſtial Lilies.* LXX. *κρινον, Lily.*

’Tis not eaſy to aſcertain how many Views the Light ſtriking upon the Orbs, and irradiating from them, may be conſidered in; nor how many Attributes the Heathens included in theſe celeſtial Lilies, or under this one Emblem of Joy, and of Rule in directing the Courſes of the Orbs, *&c.* and which was in a continued Succeſſion and ſo of Change. As this *Work* מעשה (or *Worker*) *of Lilies* was upon or againſt the Head of the Supporters, to ſhew the Power and the Manner of radiating of Light, the Queſtion is, whether there were any Supporters to the fixed Stars, or only to the moving Orbs? I think as the Stars are repreſented chained or fixed, the Supporters, which ſignify to ſupport in Motion, could not be applied to them, and the Leaves on the Pomegranates, I think, repreſented the Rays of the fixed Stars, ſo no need of the Lilies there: and if the Rays iſſuing from each moving Orb, had been ſhewed from itſelf the oppoſite Way or the Top outward, they would have been only Flowers of Lilies; but I think, the whole Plant, Root, Stem, and Flowers with ſix Rays, was exhibited from the Sun to the Side of each moving Orb, like a Sceptre whoſe pointing denotes Rule. Whether there were alſo Lilies from each of the moving Orbs croſs-ways, to vary each of their reſpective Courſes from Circles, *&c.* or whether the ſix Rays be only to ſhew, as thoſe they repreſent appear, or they imagined that one of theſe Rays went off from each to each other of the ſix moving Orbs, to vary their Courſes, deſerves to be conſidered. However, theſe Emblems here, and elſwhere in the Tabernacle and Temple, were all to attribute, whatever was attributed to theſe his created Powers, directly to God.

If theſe Columns be taken for the firſt two, and ſo the Crown be taken to be the Crown in two Parts upon the Head of the two Columns, the Caſe will be the ſame, becauſe the next Words determine the Place.

באולם. If this be not an original Word, but compounded of אול *Strength*, or איל *ſtrong*, *potent* and ם, as *Rob.* אול *Robur*, with the Affix אולם *their Strength*, as *Pſ.* lxxiii. 4. אולם *their Strength*, then it ſignifies here in their Virtue, Strength, Power, that is as far as the Sceptres of Light had Virtue or Power to make the Spirit move the Orbs, which was but in the Diameter of four Cubits. If it be one Word and Singular, then it ſignifies, *M.* "Porch, Veſtibule, Roof, Arch or Vault in Houſes; a Place to walk in, arched over." *C.* "others do not make it the Porch but Arch or Vault; in *Engliſh*, the Arches*; in common, an arched Room, moſtly in Form of a Gallery to walk in: In the latter Temple there are ſundry mentioned, as *Ezek.* xl. 30. and *the Arches*

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* אלם is alſo a Sheaf of Wheat, ſee *Gen.* xxxvii. 7. and is alſo conſtrued to be dumb, as *Pſ.* xxxi. 19. *The Lips of Falſhood* תאלמנה. Nothing reſembles an Arch turned over a Pillar ſo much as a Wheat Sheaf; and in this Form do the Lips appear, when purſed up, or drawn together in Silence, and ſo אלם is the arched Portico, the Porch or Portico ſo called from being arched over, the Reſemblance of the Canopy of Heaven.

round about. *Z. Pag.* tranſlates it by *Teſtudo* (a Tortoiſe, Shell Crab, Roof or Vault of a Houſe) The Porch of *Solomon*'s Temple was, *Schindler*, *inſtar Fornicis*, “ like an Arch — in this Porch of the Temple was the braſen Altar, on which the Burnt Sacrifice was offered, and the Drink Offering.” So in the ſecond, *John* x. 23. And *Jeſus* walked in the Temple in *Solomon*'s Porch. So here, as each Part of the denſe Work, with the fixed Stars in Chains hanging from it, was more than a Hemiſphere, and as either the Mouth or the Space, or Opening in the Æquator, from Side to Side of the fixed Stars was four Cubits, and ſo denſe Work and Chains, each half a Cubit, or the Circle the higheſt Orb made, and ſo the Courſe of the Orbs, whither the Sceptres reached, was four Cubits, or an Arch of four Cubits, the Place of the walking Orbs.

1 Kings vii. 20. *And* כתרת *the Crown upon* שני *the two Columns* גם *alſo* ממעל *above* מלעמת *over-againſt* הבטן *the Belly* אשר *which was* לעבר שבכה *the Net* (*or denſe*) *Work.*

This expreſſes, as I have ſhewed above, that the Crown was upon the Head of the two Supporters, Part upon the one, and Part upon the other, and after he has told you how the Sceptres were placed or moved; he now tells you, how the Rays of the Crown were placed or moved. גם. *Coc.* "alſo, together, likewiſe" which refers back to the Sceptres, or ſome Parts of the Crown, which were implied or expreſſed before.

ממעל. *Rob.* 732. *c.* 2. *Pſ.* lxxviii. 23. שחקים ממעל *The Æthers from above*; from above, or from the Top, that is, from every Inſide of the convex Covering, and is the very Thing and Courſe mentioned here. 1 *Reg.* vii. 33. Radii (*Rays or Spokes*), they go from the Circumference to the Centre, as well as from the Centre to the Circumference. If the Word מעל be taken to be *Pallium*, or what it repreſented, a Garment about and above all, from above and from the *Pallium*, is the ſame.

מלעמת a propinquo (*from near*). *Z. Pag. Marg.* e Regione loci medii (*over-againſt the Middle*) *M.* עמת, "a Companion, and with ל, לעמת, and מלעמת, againſt, oppoſite, over-againſt; near, cloſe by. *R.* עמת — and thoſe who communicate their Secrets and Deſigns in Confidence to each other." This Word is frequent with the firſt Prefix, but only this once with them both, and they give us one Senſe for them all, tho' in a Deſcription whatever Part לעמת expreſſes, with the מ it muſt be from it, and as there is nothing oppoſite to the Inſide of the convex Denſity or in the Belly, but the Centre of the Sides of the Orb, or Head in the Center, it muſt, in whatever Senſe the Word is uſed, be from the Centre, as *Z. Pag.* tranſlates. So *Eccleſ.* v. 15, 16. בל עמת omni Pacto. *Eng. Tranſl.* all Points (every Point).

And הבטן. *M.* It is the Name of a Fruit. The Pine Apple, Fruit of the Pine, or the Turpentine Tree, Roſin. Others, Filberd-Nuts. *Jerome*, *Terebinthi*, Turpentine Trees.—It is a general Name for the ſmall Guts; or all the Inwards.—The Belly, Womb. *Chald. Syr. Arab.* the ſame. *Schindler*, *Arab.* to hide within; cover with a Skin. מבטן covered with a Skin. לבאם מבטן a Garment put on. *Avicen*, a Waiſtcoat put next to the Fleſh. בטון an Harp. *B. C. Targ.* to produce out of the Belly. The North Wind begets Rain, *&c.*" LXX uncertain. So it is the Belly of the denſe Caſe of the Sphere, or of the Circles in the Sphere. לעבר *Numb.* xxiv. 23. and al. *to go beyond*, tranſgredi, tranſgreſs, paſs, or paſs over, (and this is the Senſe the Word is always tranſlated in) which Rays paſs or repaſs from Side to Side of the denſe Work; and which Belly is or paſſes over from Side to Side of the denſe Work.

1 Kings vii. 21. *And* יקם *he ſet up the Pillars* לאלם *in the Porch* (to the Arch or Vault) ההיכל *of the Temple.* 2 Par. iii. 17. *and He ſet up the Pillars* על פני *in the Front* ההיכל *of the Temple: one on the right Hand, and one on the Left.*

M. קום *Conſtituit,* "To conſtitute, *Chald. Syr. Arab. Æthiop. Statuit,* to ſet, ſet up, erect." LXX. ἵστημι. It is uſed by *Xenophon* for ſetting up a Trophy, and ſo tranſlated by *Tully*; and alſo by *Demoſthenes* for ſetting up a Statue of Braſs for ſome one. *S. T.* 1. *c.* 1731—1733. The *Greeks* uſed the Word. *S. T. t.* 1. *c.* 1782. παραστὰς for Pillars thus placed referring to 1809. περίστυλον ſo called alſo *ibm.* πρόστυλος and alſo *t.* 3. *c.* 1407. τημένεσμα, a Field, Place conſecrated to God, a ſacred Field." τήμενος, *Dion. lib.* 42. "Chappels, or little Temples of *Serapis.*"—*Thucyd. Ex. lib.* 1. *p.* 43. —— "In the Porch of the Temple; or before the Door."

This Way of attributing the Power they of each Sect aſcribed to the God they worſhipped in each Temple was, as may be eaſily ſhewed, univerſal in all Places we have any Account of, [nay even the *Chineſe* at this Day have two Poſts, and ſome Deſcription in Imitation of theſe) and was thus ſymbolically repreſented and ſet upon two Columns in or before the Porch: And hence all the Stories of Knowledge preſerved upon the two Pillars of *Seth*, (which the learned *Dodwell* takes to be of the God *Soth*) tho' nothing of that could remain at the general Diſſolution of ſuch Things at the Flood; yet after the Flood this really was the Way of preſerving natural Knowledge, and thoſe who underſtood the Things and Powers by the Emblems, after Writing was made known, might reduce that Knowledge into Writing, from which the Scraps which have been cited and preſerved it's likely came: So far the Author *Sanchoniathon*, if there was ſuch an one, or his Forger, was in the Right. And as theſe were to attribute all this Syſtem, and all the Powers in it, which the Heathens had branched out to ſeveral, to God, all the Parts were all ſymbolically to be repreſented here. And as they were intended to reclaim, from all who ſhould ſee them, they were placed in the ſame Manner as the Heathens had placed theirs; not only as a Signal to thoſe who were not permitted to enter into the Temple, but in an open Porch or Gallery before the Temple, ſo that they who were not permitted to enter, but were to worſhip without or in the Courts, or came out of Curioſity from other Countries, might ſee them.

Whether the cloudy Pillar, which ſtood at the Door of the Tabernacle, *Exod.* xxxiii. 9. was in Alluſion to theſe is not determined; however it is certain, that the Glory of the Lord which appeared in the Cloud, *Exod.* xvi. 10. *&c.* was a Repreſentation of that which this Crown repreſented.

And as the *Jews* worſhipped with their Faces towards the Weſt, and thoſe of all other Nations with their Faces towards the Eaſt, the two Hemiſpheres of North and South were known, though in an oppoſite Manner, by the Terms *Right*, and *Left*; ſo the Temple which repreſented the World was diſtinguiſhed. Thence diverſe Deſcriptions and Rites, as *Lev.* xiv. *&c.* and to this alludes *Pſ.* lxxxix. 13. *The North and the South (Heb.* Right Hand) *thou haſt created them.*

1 Kings vii. 21. *And he ſet up the right Hand Pillar and* ויקרא *called the Name of it* יכין Icin; *and he ſet up the left Hand Pillar, and called the Name of it* Boz. 2 Chron. iii. 17. *and he called the Name of that on the right Hand* Icin; *and the Name of that on the left* Boz.

יקרא *He called.* If theſe Words be Subſtantives, and if he meant the Columns, to *call*, to *name*, is not ſufficient here, as theſe were the Emblems of the two great Agents, he called, preferred, appointed them to their reſpective Offices as they are made by the LXX. Ιαχοὺμ. Βόλωζ. Κατόρθωσις, Direction. — Ισχυς, *Fortitudo*, Fortitude. *S. T. t.* 2. *c.* 1442. Κατορθωσις — "Succeſs in the Management of an Undertaking happily atchieved; ſetting a Thing right, as" *Cic. Inter. S. T. t.* 1. *c.* 1811. Ἰσχυς, "Strength, Power. *Xenop.* you read alſo ἴσχυος ῥωμη — in *Philo de Mundo*, which is conſtrued *Vis Roboris*, or Force of Strength."

If יכין be a Verb Singular, and refer to the Crown upon the Columns, and ſo it be a Deſcription of his making it, or of its Conſtitution, then he prepared the Matter, and made it a Machine, or it is prepared and made a Machine. *Syr. Naturam indidit. Arab. ibm.* They worſhipped the Power and Symbol by this Name. *Amos* v. 25. See *M. Pr. Pt. 2d p.* 81. *But ye have born the Tabernacle of your* Moloch (*King*) *and* Ciun, from the ſame Root as *Icin*. יכין, כיון, both from כון. See *Trinity of the Gent. p.* 464.

If בעז be a compound Word of ב and עז, then it is *in Strength, in Power*, either in his Power who made it, or in Power it is poſſeſſed of. *M. Fortitudo*, "Strength, Power, Dominion, Command, Reign." *C. ibm.* They worſhipped a Power in the Heavens by this Name. *Dan.* xi. 38, 39. אלה מעזים. *M. Pagn.* tranſlates it *Mars*, and had Statues to it, perhaps the ſame as before us. *Ezek.* xxvi. 11. *and* מצבות *the Statues of thy Strength ſhall come to the Ground*; and *Neh.* vii. 28. and *Numb.* vii. 17. the Temple of the Strength (See *Trinity of the Gentiles*, *p.* 450. & 534.) of the Subſtance, Maker, *&c.* or of their Strength; if it be compounded of עז and זם, the Strength of their Contrivance, implying ſomething like Thought or regular Diſpoſition in them.

Beſides the Myſtery of the Scape-Goat, *Lev.* xvi. 20. the Word עז is alſo uſed for the Repreſentative, a Goat, and עזניה ſome Eagle. *M. Aquila marina. Chal. Jews*, the *Roman* Eagle. Hence the Eagle was unclean, the Goat ſacrificed, Skins and Hair uſed about the Tabernacle; thence *Pſ.* xcvi. 6. *Strength and Beauty are in his Sanctuary.* Dan. xi. 31. *Sanctuary of Strength.* Pſ. xxix. 1. xcvi. 7. *Aſcribe to* Jehovah *Glory and Strength*; and we have a Deſcription what this is which they had attributed to them, which were to be attributed to God, *Pſ.* lxviii. 35. *Aſcribe Strength to the* Aleim: *His Height is over* Iſrael;

and his Strength in the Æthers. Pſ. cl. 1. *Praiſe him in the Expanſion of his Strength.*

1 Kings vii. 22. *And upon the Head of the Pillars Lily Work.* He made a Diſtinction above between the Supporters within the Crown, this was upon the Head of the two Columns, which ſupported the two Parts of the Crown, and repreſented as above. 1 Kings vii. 22. *and* מלאכת *the Work* (Machine) *of the Pillar* תתם *was perfect.* The Word מלאכת *Gen.* ii. 3. is Singular, one Legate, ſo an Archtype of God. Nothing Plural but the Heavens. The Subſtance of theſe three Agents exiſt in one another, their Action in one another.

As theſe (the Temple, *&c.*) were Emblems of the Heavens and this Syſtem in it, the Writer uſes the ſame Word for the Emblem, as *Moſes* when he gave a Relation of finiſhing the Syſtem gave to it, cited in the *2d Pt. of M. Pr. p.* 96—102—107. *Gen.* ii. 2. and the *Aleim* finiſhed (*v. complevit*) on the ſeventh Day מלאכתו his material Legate which God created לעשות *to work.*

The Word uſed here expreſſed to be perfect in the whole and in Parts, perfect in their Form, Solidity, Dimenſions, Number, Quantity, in Proportions, Stations, Motions, Strength, Vigour, Operations, *&c.* This Word was together with *Urim*, *Exod.* xxviii. 30. uſed for ſome Emblem put upon the Breaſt of the High Prieſt. *C.* תמים and אורים. LXX. *αληθεια*, "and as the *Ægyptian* Prieſt had an Ornament which was called *Truth*, *t.* 1324. in which was nothing fictitious but the utmoſt Simplicity." *Elian*, and others. So makes the Emblems refer to *Chriſt*. How the Attributes to the three Conditions of the Matter of the Heavens are attributed to each of the Perſons in the Godhead will appear afterwards*.

As the Heathens had ſet up the Emblems of the Powers of the Heavens in their Porches and Temples, ſo were the Emblems of thoſe Powers ſet up and attributed to God in his Porch and Temple, and as the Prieſts of the Heavens wore Emblems to repreſent thoſe Powers, ſo the High Prieſt of God, as his Repreſentative, wore Symbols to repreſent or attribute, that theſe Powers in the Heavens, and Power over them, was in him, and thence theſe Claims, and Attributes and Sacrifices, of Perfection, Strength, *&c.* See the Particulars——*cloathed with Strength*, &c.

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* This is largely explained in ſeveral of the Books publiſhed ſince this was wrote.

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